POPULAR MECHANICS
SHOP NOTES

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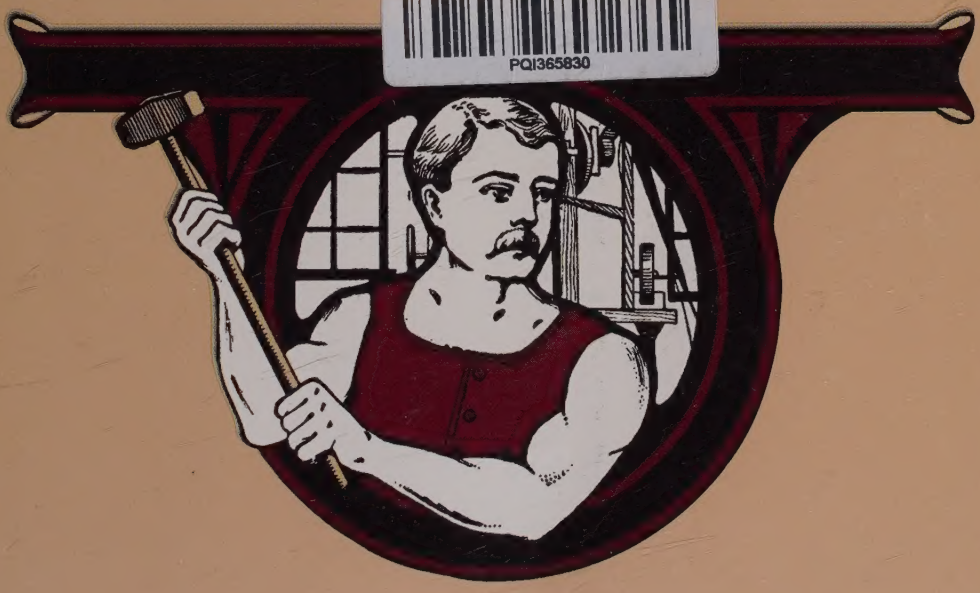

FOR 1911 VOL. 7

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Publisher's Note

Virtually every woodworking magazine in the English-speaking world has a shop notes section and has published an accumulation of them in book form. This was all started in 1905 with the first annual issue of *Popular Mechanics Shop Notes*, a compilation of advice on jigs, fixtures, methods of work, processes and projects. The earlier issues focussed primarily on metalworking, but with tips for a variety of other trades liberally sprinkled throughout. As years went by, the contents shifted more and more to woodworking and handyman projects. Each book is profusely illustrated. The line drawings of the earlier issues were supplanted by superb engravings until photographs started to creep in during the 1920s. Each year has its charm but all issues share the attribute of being clear, concise and widely informative.

Leonard G. Lee, Publisher
Ottawa
September, 1999

WARNING

This is a reprint of a book compiled in the early 1900s. The book describes what was recommended to be done in accordance with the knowledge of the day.

It would be advisable to treat all corrosive, explosive and toxic materials with much greater caution than is indicated here, particularly any materials that come in contact with the body.

Similarly, some of the recommended projects were dangerous then and remain so now. All of this material should be regarded with a judicious eye and necessary precautions taken.

POPULAR MECHANICS

SHOP NOTES

FOR

1911

EASY WAYS TO DO HARD THINGS

OF DAILY USE
TO EVERY MECHANIC

Vol. VII—Table of Contents, Pages 1431-1437

PRICE 50 CENTS

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Shop Notes Department of Popular Mechanics

As Published Monthly During 1910

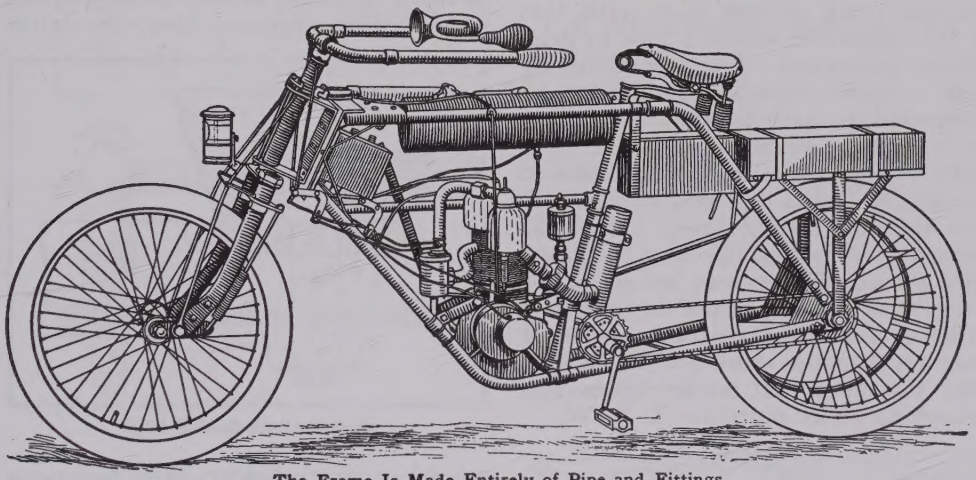
Edited by H. H. WINDSOR

SHOP NOTES

Home-Made Motorcycle

The frame of this motorcycle is double throughout and made from ¾- and 1-in. gas pipe and pipe fittings. A piece of round iron was inserted in the pipes at each bend to make sure of a rigid frame. No threads were cut on the pipe and the tees used for the cross ties were reamed out, slipped over the pipes, and fastened with a pin.

very light runabout. The belt wheel attached to the rear wheel is made from band iron and attached with lugs to the rim. This belt wheel is peened with a hammer in the center to make the crown. A double-ply 2-in. flat leather belt is used to drive the machine. The rear wheel is fitted with a ratchet sprocket, so the engine may be started



The Frame Is Made Entirely of Pipe and Fittings

The construction of the forks make them very strong and springs were attached as shown. The wheels and engine were taken from an old and

by peddling. The complete motorcycle weighs 310 lb., has a 70-in. wheel base, 26-in. wheels and a 4-hp. engine.—Contributed by J. O. Turner, Franklin, Ky.

Removing Scale from Water Jackets

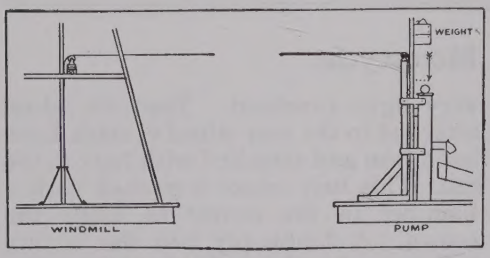
Scale usually may be removed from within the water jacket by means of a 20 per cent solution of muriatic acid, says the Nautical Gazette. The jacket is filled with this solution and allowed to remain 3 or 4 hours to dissolve the scale, which may then be blown out. Care must be taken to avoid burns from the acid. The jacket must be carefully washed out afterward with clear water.

A Fire Kindler

Put about a gallon measure full of sawdust that has been well saturated with kerosene into a deep tray. Add enough melted rosin to stiffen the entire amount when it is cold. When cold, this mixture can be cut into squares and put away until ready for use. Put one square of the kindler into the fireplace of a stove and place the fuel on top. A hot fire will be produced a short time after the lighting.

Substitute for a Windmill Quadrant

The usual device for transmitting power from a windmill to a pump

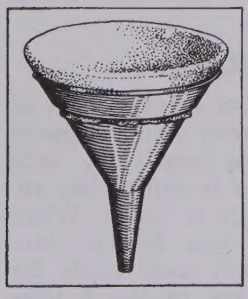


Single Wire Operates the Pump

where there is a distance between them is the quadrant. The wires of the quadrant will stretch, and with that of the expansion, cause a jerk in driving the pump rod. The accompanying sketch shows how a windmill was connected to pump water from two wells which were dug several rods apart. A single wire was fastened to the windmill rod, run over two pulleys and attached to the pump rod of the second well pump. A box weighted with pieces of iron was bolted to the pump rod to produce the down stroke and the windmill furnished the power to make the up stroke. The weight kept the wire taut at all times and caused no jerky motion.—S. R. W.

Chamois Strainer for Gasoline

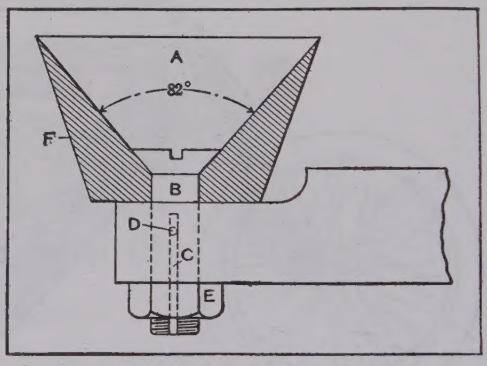
All dirt and particles of water should be removed from gasoline that is placed in the tank for use of an automobile or motorcycle engine. About the best method is to strain the gasoline through chamois. A good strainer can be made from two 5- or 6-in. funnels by cutting about 2 in. from the top of one funnel to be used as a band on the other. Procure a 9- or 10-in. square of chamois and trim the piece round.



Stretch the round chamois over the top of the funnel and then slip the band over the bottom end and up over the edge of the chamois. Push the chamois down slightly in the center and the strainer is ready for use. This kind of a strainer will remove all dirt and water from gasoline which will save considerable trouble for the autoist.—Contributed by Riley Lucas, Carrollton, Ohio.

Turning Tool for Wood

A new kind of wood-turning tool for turning wooden rolls is shown in the accompanying sketch. The cutter, A, is made of either carbon or high speed steel. When turning fiber, the latter



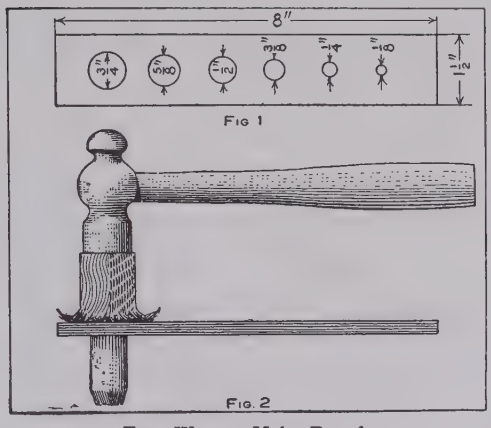
A Full Circle-Cutting Edge

would be much better, says American Machinist. The cutter is bored at an angle of 82 deg. so as to accommodate the head of a regulation flathead machine screw, B, which has a spline, C, on its body in which the pin, D, slides; this keeps it from turning when the nut, E, is tightened. The main body of the tool holder is made of machine steel. The face angle, F, can be made to suit the material being turned. The one illustrated has about 40 deg. angle, which would be about right for maple and similar hard woods. Softer woods might require a more acute angle both inside and out. A cutter, A, 1½ in. in diameter, would have nearly 5 in. of cutting edge. When dull at one point the nut, E, is slackened and the cutter turned so as to present a new cutting edge to the work. When the whole

cutting edge is dull the cutter is removed and ground on the face.

How to Make a Dowel-Cutting Tool

Secure a piece of steel about ¼ in. thick, 1¾ in. wide and 8 in. long. Drill various sized holes through the steel as shown in Fig. 1, leaving the edge of each hole as sharp as the drill will make them. Cut off a block of wood the length necessary for the dowels and split it up into pieces about the size for the particular dowel to be used. Lay the steel on something flat, over a hole of some kind, then

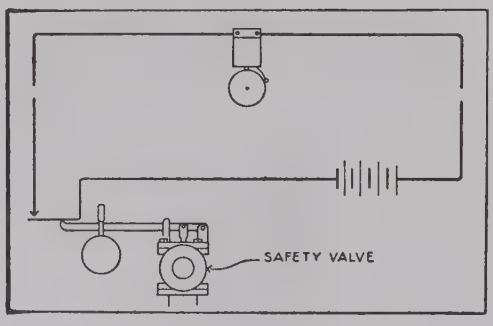


Easy Way to Make Dowels

start one of the pieces of wood in the proper size hole for the dowel and drive it through with a hammer, as shown in Fig. 2. The sharp edges on the steel will cut the dowel as smooth and round as if it were turned in a lathe.

Safety Alarm for a Steam Heater

Some persons taking care of steam heaters will retire at night and leave the draft open, which is liable to cause an explosion. The accompanying sketch shows how I connected up a bell that would ring when the safety valve rose. The valve could not be heard in the bedrooms, so the bell was placed in my room and connected to the safety valve on the boiler. When the valve would rise it would make the

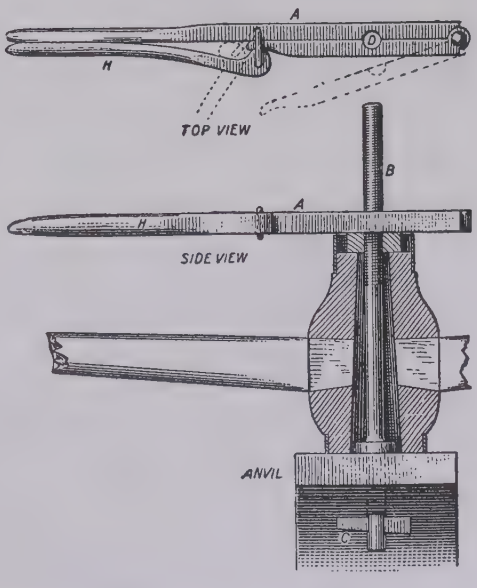


The Wiring Diagram

connection and ring the bell.—Contributed by Albert P. Carr, Anthony, R. I.

A Wheelwright's Holding Tool

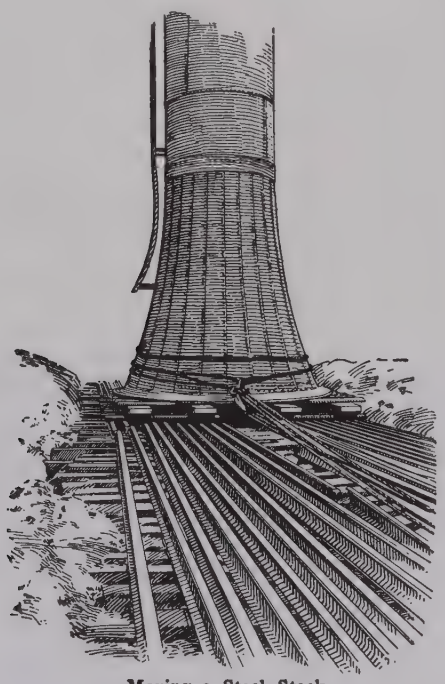
This tool is to be used on the anvil to hold wheels while taking out bolts and to bolt them. The wheel can be fastened in a few seconds. The lever, A, is made from an old buggy top joint. The joint is closed and a ½-in. hole, D, drilled and a thread cut to fit the rod B. The rod B has a hole in the end for a pin to go through to hold it to the anvil. The handle H operates the lever A so it can be put on or taken off quickly. One turn of the lever will tighten the wheel.



Clamping a Wheel to an Anvil

Moving Large Steel Furnaces

While remodeling a large steel plant it became necessary to move three



Moving a Steel Stack

large stacks, each 16 ft. in diameter, 150 ft. high and weighing approximately 200 tons. Each stack was lined throughout with firebrick. The stacks were moved 150 ft. without taking them down. As the new foundations were 15 ft. below the level of the old ones, a trench was dug with a steam shovel to make the intervening distance on an incline. Ties were placed on the bottom of the trench and steel rails fastened close together on top of them. Hydraulic jacks were used to lift each stack to make a space to extend the rails beneath and place the structure on steel bars and rollers. Each stack, while being moved, was held vertical with eight guy ropes. Block and tackle was used in pulling the stacks down inclined tracks.—Contributed by J. W. Beddow, Ensley, Ala.

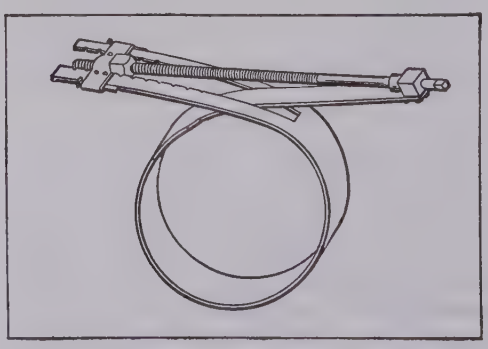
Bell metal composed of copper and tin may be improved by adding a small quantity of iron.

Making Use of Scrap Paint

A little economy which is practiced in the paint shop of the Nashville Railway & Light Company is the saving of all scrap paint, says Electric Traction Weekly. A large "slush barrel" is located in the paint shop and each evening a man cleans up the brushes, gathers up the odds and ends, and carefully scrapes out the cans that have been used during the day and mixes it in this tank. A little oil and green coloring matter are added to bring it to the standard color of the company, and after thoroughly straining, the mixture is put up in cans for use as floor paint, roof paint, truck paint, pole paint, etc. A great deal of paint is accumulated in this way and the master mechanic finds that it is well worth the trouble.

A Commutator Clamp

The end rings of a commutator must be taken out when it is necessary to look for internal grounds. The accompanying sketch shows the construction of a commutator clamp for use in holding the segments in place while the rings are removed. The clamp is made of ⅛ by 2-in. sheet steel with a ½-in. screw. The drawing clearly shows the adjustable fastening. The notches fit around rivets on one side of each fastening, which can be



Made of Sheet Metal

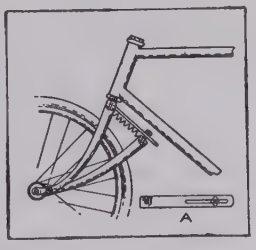
moved by removing two cotters, says Power. The clamp is made loose or tight by screwing the bolt in the nut.

Metal Melts in a Cupola Quicker in Cold Weather

The reason why metal can be melted in a cupola quicker on a cold day is because the draft from the blower usually comes from the outside where the moisture has been frozen out of the air, says Castings. When cold, the air is more dense, and with each revolution of the blower the cupola gets an increased number of pounds of oxygen with less than the usual amount of moisture, conditions which tend to produce a hotter fire and more uniform working.

Home-Made Spring Fork for a Bicycle

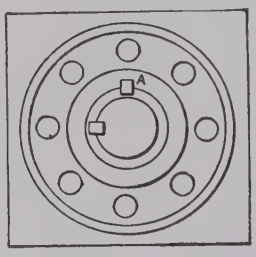
Cushion forks attached to a bicycle eliminate the jar on the rider's hands and arms. Old types of bicycles were not equipped with this special feature and as I had one of these wheels, I determined to have a spring fork of my own make. A fork was secured from another old bicycle and the stem cut off close to the crown forging.



Two extra holes were drilled in the fork ends about 2 in. up from the regular holes for the front wheel axle. The old fork was then put on the front wheel in the usual way and the fork for the bicycle fastened with bolts put through the two extra holes as shown. A strap of iron is fastened with a bolt to the under side of the fork crown on the bicycle. The strap of iron has a slot cut 3 in. long in the other end as shown at A in the drawing. Another bolt is loosely fitted in the slot of the strap iron and fastened in the crown of the extra fork. The ends of a coil spring are fastened to each bolt. A suitable spring coil can be purchased from almost any hardware merchant.—Contributed by V. L. Beeman, Cleveland, O.

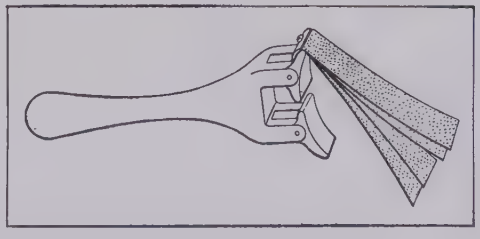
Bushing a Flange Coupling

The accompanying sketch shows a method for reducing the bore of a shaft coupling. A correspondent of Southern Machinery had to use a coupling with the hole too large, as there was no other in stock with the right sized hole. The coupling was chucked in a lathe and a cut taken to make the bore true again, and as the old keyseat could not be removed altogether, a cast-iron bushing was made to fit the coupling and the shaft. A keyseat was cut into the bushing, A, to correspond with the old keyseat, and another keyseat cut to tighten the coupling on the shaft. After the coupling was placed on the shaft, the bushing key was driven first to tighten the bushing, then the key to hold the coupling on the shaft.



A Sandpaper Holder for Dressing Commutators

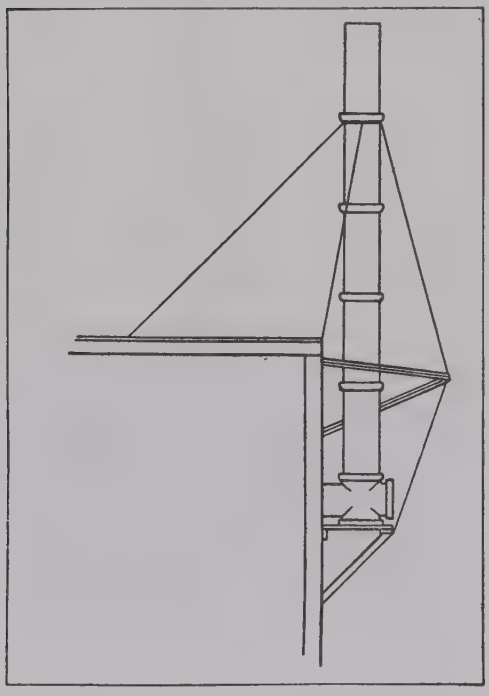
The handle of the holder has two blocks with an arc of a circle on each face 2 by 2½ in. These blocks are pivoted and adjust themselves to fit any sized commutator. If the commutator has four brushes, the lower block will go in between the brush holder, says a correspondent of Power. A commutator may be kept level and smooth with this device.



Will Fit Any Sized Commutator

Guying a Smoke Pipe

Where a temporary chimney is put up on the side of a house, kitchen or



The Guy Wires as Attached

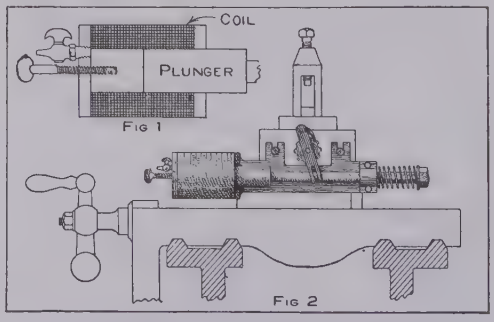
shop, the way to attach the guy wires is shown in the accompanying illustration. Three wires are fastened to the roof and the fourth one taken over the end of the V-shaped brace or bracket and down to the shelf on which the tile chimney rests, says the Industrial Magazine, or it can be fastened to the side of the building.

Magnetic Feed for the Compound Rest of a Lathe

The compound rest of an engine lathe does not have any self feed, except on very large sizes, and I constructed a device to obviate the necessity of feeding by hand when turning parts that had a bevel similar to friction clutches used on automobiles.

The handle of the compound rest was removed and a ratchet wheel and pawl placed on the screw in its stead. A strip of iron was placed across the rear end of the rest which was attached with screws in slots for adjustment. The magnet, plunger and spring were fastened to this iron. The magnet was made as shown in Fig. 1 with the magnet wire wound on a piece of soft steel tubing, one end of which was closed and a small petcock attached, also a thumbscrew for adjusting the stroke of the plunger. The plunger was turned from soft iron to a sliding fit in the magnet core with a smaller extension that passed through a bearing at the opposite end of the support which carries an open spring on the projecting end. This spring would draw the plunger from the coil when the current was broken. The completed device as attached to the compound rest is shown in Fig. 2.

A fiber finger was fastened behind the chuck on the lathe that operated the switch at every revolution of the lathe spindle and sent a current of electricity through the magnet wire. After suitable connections were made from a lamp socket to the switch and magnet, the cut was started in the metal by hand with the regular handle which was then slipped off and the ratchet wheel with the pawl put on in its place. The magnet would draw in the plunger at every revolution of the chuck where the fiber finger would make the connections on the switch and turn the compound screw through the intermedium of the lever, ratchet and pawl. When the current connections were broken, the spring at the end of



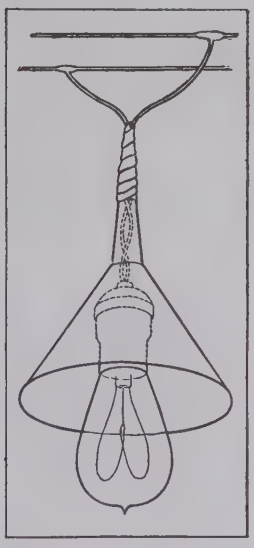
Method of Attaching to a Lathe

the plunger shaft would draw the plunger and pawl back for another

operation. In order to prevent too quick an action the petcock was so adjusted as to allow only a gradual escape of the air compressed by the plunger. The thumbscrew regulated the travel of the plunger and thereby the amount of feed.—Contributed by Chas. Chaffner, Maywood, Ill.

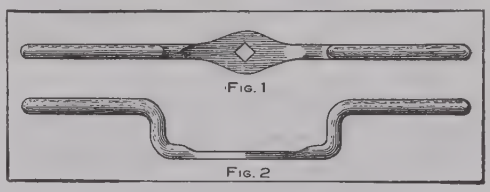
Waterproofing a Common Electric Socket

Several electric lights had to be placed out in the open and we did not have the weatherproof sockets at hand so a substitute waterproof device was used, which we made as follows: The right number of common tin funnels were purchased and each socket and globe protected by putting a funnel upside down on the supply wire as shown in the sketch. The wire and small end of the funnel were well taped to make it waterproof. This not only served well the purpose for which it was intended, but the funnel made a good reflector.—Contributed by H. D. Harkins, St. Louis, Mo.



An Offset Tap Wrench

Occasion may demand the tapping or reaming of a hole that is so located as to cause the handle of the holder to strike some projecting part before the tool cuts through the metal. In such a case, procedure is impossible, unless a part of a turn is taken and the wrench then changed. The accompanying sketch illustrates a wrench that is quickly made from 5/8-in. round steel which can have sufficient offset for the handles to be out of the way when turning taps or reamers in recesses. Figure 1 illustrates the plan and Fig. 2 the elevation of the wrench.

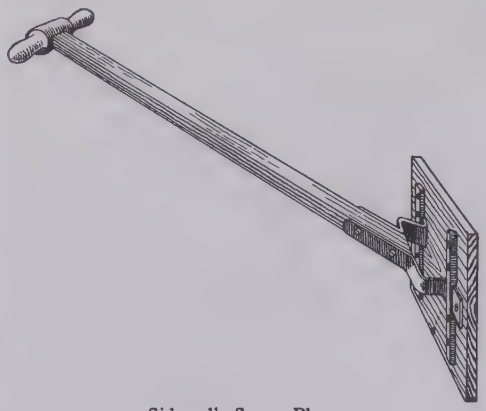


The Wrench with Offset

The edges of the 3/4-in. square hole can be hardened and a set of bushings made from sheet metal to place in the hole that will hold taps in sizes from 1/4 to 3/4 in. A mechanic will find this a very useful addition to his kit of tools.—Contributed by Donald A. Hampson, Middletown, N. Y.

Home-Made Snow Plow for Sidewalks

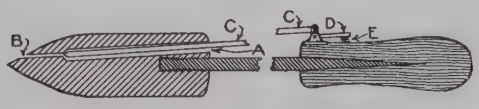
This is one instance where a lawn mower can be used in the winter as well as the summer time. The handle and braces are taken from the lawn mower and attached to a board 1 in. thick, 12 in. wide and 18 in. long. Two strips of wood 1 by 2 and 10 in. long used as battens over the handle braces and fastened with screws complete the snow plow, as shown in the illustration. A piece of tin tacked over the face of the board will greatly assist the snow in sliding from the plow.—Contributed by J. Gordon Dempsey, Patterson, N. J.



Sidewalk Snow Plow

A Fountain Soldering Iron

A fountain soldering iron may be made by drilling an ⅛-in. hole to one side of the tip, straight back into the iron and connecting the same with a



Solder Receptacle in the Copper

¼- or ⅜-in. hole, bored from the top of the iron as near the middle as possible. Solder may be melted and poured into the well from the top, or, better still, use the right size of stick solder and a length may be added while the iron is hot and being used. The iron should be held in a nearly horizontal position, with the point directed slightly downward, the hole, of course, being on the upper side. Capillary attraction will prevent the solder running out of the hole. In use, the solder will flow freely, but may be arrested at any moment by tilting the point upward.

Another method of making the iron is shown in the illustration. The apparatus is all of the simplest construction and can be readily made of sheet iron and wire. The small hole B supplies the melted solder to the point of the iron. The large hole A is the solder receptacle. A valve constructed from a wire, CC, controls the flow of melted solder through the opening B. The valve rod keeps the hole closed by pressure from the spring E, which is placed under the thumb catch, D. A slight pressure of the thumb on D will release the valve wire and allow the melted solder to flow out on the point of the soldering-iron. Any solder can be used with this kind of an iron, as it will melt and run into the well when the iron is hot.—Contributed by C. W. Nieman, New York City.

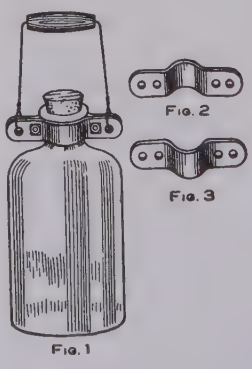
Remove the nozzle from the hose when washing automobile bodies. The water coming through a nozzle will have pressure enough to cause the grit to scratch the varnish.

Rubber Does Not Melt

So many persons have the impression that rubber can be melted. Rubber cannot be melted by heat, yet it can be put into a more or less liquid form by other means. Pure gum rubber will melt easily at 300 deg. F., but commercial rubber has been vulcanized and will not melt. To "devulcanize" rubber is to boil it with an 8-per cent. caustic soda solution; then it is washed, dried and treated with carbon bisulphide or benzine until it is dissolved. The solvent is distilled off to obtain the rubber, but the stuff thus obtained is of small value and has very little strength. To make rubber cement, pure gum rubber must be used. It is dissolved in cold naphtha and a little powdered chalk is usually added. The sulphur added to vulcanize rubber spoils it for melting or other purposes for which pure gum rubber only will answer.

Handle for Carrying a Large Bottle

The water taken from a certain deep well proved to contain certain medicinal properties and the nearby inhabitants would carry the water to their homes in large bottles. As a large bottle is not easily carried without a handle, one person in that neighborhood devised a home-made handle as illustrated in the accompanying sketch. Two pieces were cut from sheet brass, each ¾ in. wide and 6 in. long with the ends rounded off with a file. A ⅛-in. hole was drilled ⅜ in. from the ends of both pieces and another ⅛-in. hole drilled 1¼ in. from each end; this will make four holes in each piece. The pieces are then shaped around the neck of the bottle making a close fit and riveted together through the two in-

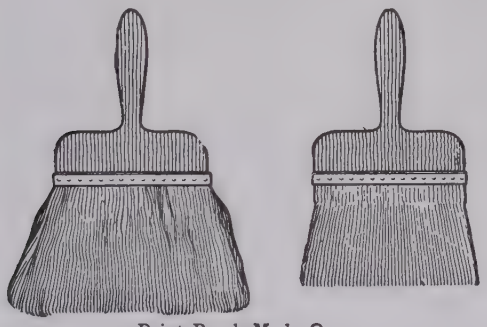


side holes; the outer holes are used for the handles.

Bore a small hole through the center of a 3-in. piece of broom handle and put a piece of wire through, bend it at right angles on both ends of the wood and form a loop in each hole of the brass strips.—Contributed by Oscar M. Sherir, Jasper, Alabama.

Making Over an Old Paint Brush

When a brush is used in varnish and thick paints the mixture usually sticks to the outer hairs and seldom, if ever, reaches the center part. If the brush is left in the bucket and the paint dries, it will produce a hard crust on the outside. A great many painters will throw such a brush away. There will



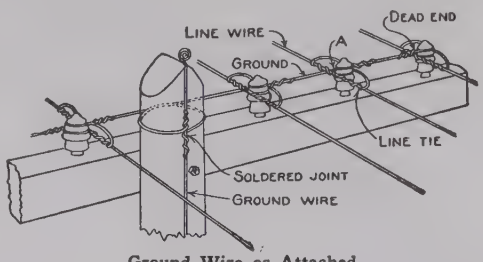
Paint Brush Made Over

be no need of doing this if you take a sharp knife and cut around the top part of the hairs, cutting away the outside part with the dried paint and leaving nothing but the unused hairs remaining. This will make a smaller brush, but it will be practically a new one. The first illustration shows the ordinary brush and the second, one that has been cut down.—Contributed by John Bostie, Kansas City, Mo.

A Home-Made Line Lightning Arrester

A very efficient, as well as inexpensive, lightning arrester that will furnish auxiliary protection for the pole line and instruments is shown in the accompanying illustration. A correspondent of Telephony has used this plan for lightning protection for over two years and it has given practically no trouble from grounded lines.

The insulators should be of the double-groove type, with the line tied



Ground Wire as Attached

in the bottom groove, and the tie ends left long enough to reach within about 1/4 to 1/8 in. of the ground wire. The latter is run from the pole to the end of the arm, and tied in the top grooves, with ties cut off close as at A in the sketch, and staggered on the glass to take up the slack after the dead ending. They are placed in this position so that the line wire may not fall upon the ground in the case of a broken insulator, tie, etc. By having the line ties project to the ground wire, instead of the opposite way, they are protected from being cut in two by the lightning discharge, and also prevent water from standing between the line and the ground. The accompanying sketch makes the wiring clear and shows how the ground wire is attached to the ground wire already on the pole.

Fountain for a Common Steel Pen

The accompanying sketch shows a little device for holding a quantity of ink in an ordinary steel pen. This device consists of a small coil of wire made conical and with a loop to pass around the pen for holding it in position. The coil of wire will hold enough fluid to write at considerable length without dipping the pen. —Contributed by Chester Purdy, Ghent, Ohio.

Apply zinc white paint rather thick and spread out under the brush.

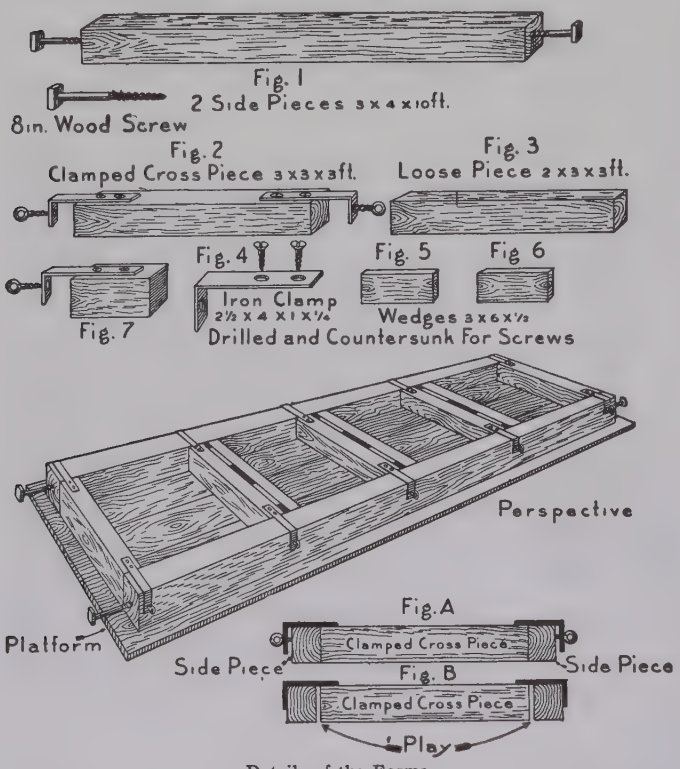
Origin of Standard Railroad Gage in United States

The 4-ft. 8½-in. railroad gage, called "standard gage" in the United States, came originally from horse-operated tram roads in England. One of the earliest of these to use iron rails was built in 1776 for the Duke of Norfolk's colliery near Sheffield. The rails were laid for what was intended to be a 5-ft. gage inside to inside of the wheels of the vehicles.

These rails were of cast iron and flanged. The odd dimension of 4 ft. 8½ in. is the result of a change from flanges on the rail to flanges on the wheel. The first locomotive built with the flanges on the wheels was constructed by George Stephenson in 1814. As his engine was only an experiment, he adopted the 4 ft. 8½-in. inside gage so that it would fit the existing tracks, and from that time to this it has been generally adhered to.

Forms for Making Concrete Sidewalk Flagging

The ease with which concrete lends itself to almost every form of construction, enables even the most inexperienced to produce with it articles of practical worth and utility; the commonest being cement blocks.



Details of the Forms

Various forms of home-made moulds are used, their construction depending entirely upon the ingenuity of the block maker. The writer has met with good success in using the adjustable frame described herewith, its construction permitting the frame to be moved almost as soon as the cement sets. This allows more rapidity in the manufacture—most men like to keep on with the work when once they have acquired the swing.

The frame consists of two side pieces 3 in. thick, 4 in. wide and 10 ft. long, fitted at each end with 8-in. wood screws to serve as handles, Fig. 1; three loose pieces, Fig. 3, 2 in. thick, 3 in. wide and 3 ft. long, five dividing or crosspieces, Fig. 2, 3 by 3 in. and 3 ft. long, fitted at each end with L-shaped iron clamps, Fig. 4. These clamps should be ¼-in. wrought iron, 1 in. wide, 4 in. long on top, with a right-angled bend, 2½ in. long, at one end and drilled with two countersunk holes on top and one hole for a screw eye in the angle end. Screw the clamps on the ends of the crosspieces so as to allow some play between the inner faces of the clamps and the outer edges of the side pieces. The purpose of this is to permit the side pieces being moved a trifle away from two sides of the completed blocks. This is shown in Figs.

A and B. Two or more wedges, Figs. 5 and 6, ½ by 3 by 6 in., are placed between the loose crosspieces and dividing pieces to accomplish the same purpose for the other two sides of the completed blocks.

The proportions of this frame will give four blocks 3 in. thick, 2 ft. wide and 3 ft. long. It can be adjusted to make a longer or smaller number of blocks by dispensing with or adding more dividing and loose pieces. Yellow pine was used for the side and dividing pieces and hemlock for the loose pieces. For strict accuracy, the frame would have to be 9 ft. 10½ in. to mould four blocks in proportions given, but this discrepancy is easily overcome by setting the end crosspieces ¾ in. in from each end.

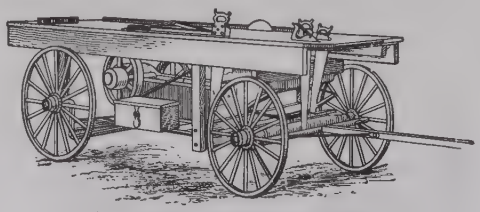
In operation the end pieces are placed in position, screw eyes screwed through the holes in the clamps and into the side pieces, crosspieces inserted and clamped, the loose pieces placed against them and wedges inserted between. The lining of newspapers is now placed on the bottom and against the four sides of each block space, concrete is poured in, rammed and the top coating poured on and planed off with a straightedge when sufficiently set.

The frame is removed by unscrewing and withdrawing the end pieces; unscrew the crosspieces and pull the side pieces outward as shown in A and B. Withdraw the wedges, draw away and remove the loose pieces, do likewise with the clamped crosspieces and finally take away the side pieces.

With a number of platforms, a surprisingly large number of blocks can be turned out in a short time, and the work can be kept going continuously with the one frame.—Contributed by James M. Kane, Doylestown, Pa.

A Carpenter's Workbench on Wheels

The accompanying sketch shows how I made a handy workbench on wheels, which can be drawn by a horse or hitched on behind another vehicle and taken out on a job of work. A small gasoline engine hung on supports beneath the bench runs a circular saw. A place is provided for all tools

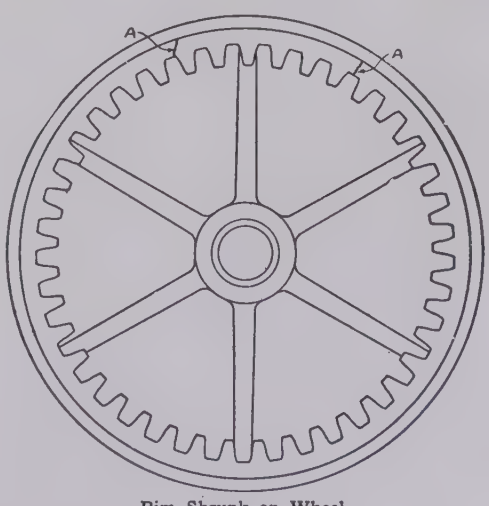


Power Saw Attached to Bench

necessary to be used on any one job. While this is something new and only a saw propelled by the engine, other workmen may be able to add to this device something more than an ordinary power-driven saw.—Contributed by James M. Stockman, Milton Junction, Wis.

A Quick Repair for a Broken Annular Gearwheel

An annular gearwheel, used to drive a mowing machine, was broken at the points A A, as shown in the accompanying sketch. As it was during the busy season and no repairs being at hand, a blacksmith forged a ring of ⅜-in. strap iron and put it on the wheel hot. When the metal cooled it drew

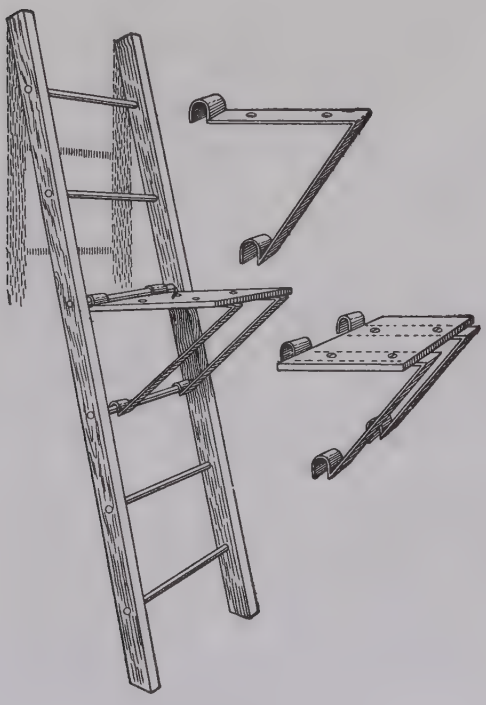


Rim Shrunk on Wheel

the breaks together and the wheel was to all practical purposes as good as new.—Contributed by P. Arthur Tanner, Carson, Iowa.

Flat and Adjustable Step for a Ladder

House painting is very easily done by painters having their own scaffolds, but a person desiring to do his own



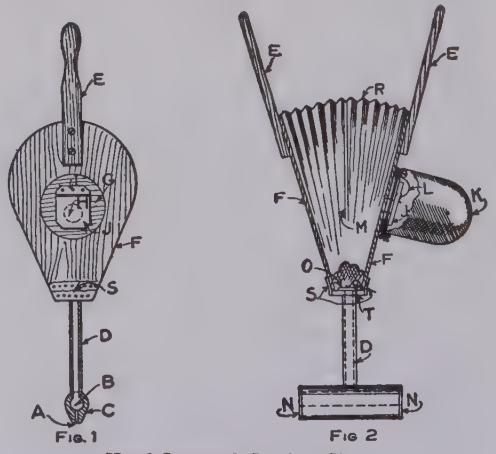
The Step on the Ladder

work will have only a ladder to take the place of a scaffold. To paint and stand on the rungs of a ladder all day will tire one's feet. As the writer had to do some painting and a ladder was the only thing obtainable to climb upon, a flat detachable step was made to put upon the rungs of the ladder to stand on the same as a scaffold. The step can be adjusted to any part of the ladder for the painter to stand upon and paint a surface within easy reach. Two irons were bent V-shaped as illustrated, each end having a half circle to fit over the rungs of the ladder. Two holes were drilled in the top angle in which to put bolts for fastening the flat step. The step can be quickly changed from one position to another. A person will feel as safe on the step as if he were on a staging.—Contributed by John Blake, Franklin, Mass.

Home-Made Vacuum Cleaner

This cleaner consists of a bellows formed by the pieces marked F in the sketch and some flexible material such as leather, leatheroid or any material that does not allow the air to pass through. Handles, E, are attached to the sides F with screws or nails. The mouthpiece, C, is made from a piece of wood 2 by 3 by 5 in. with a ¾-in. hole, B, bored through and the piece dressed down as shown. An opening is made into the hole B with a saw cut, A, and both ends covered with small pieces of wood, N, glued to the mouthpiece. The small tube B is a piece of bamboo, the ends of which are fitted and glued into the mouthpiece C and the block T. The sides F are attached to the block T by means of leather hinges, S, which are glued and well tacked to both pieces. A piece of wood, M, is made the same shape as the sides F and fastened in the center of the bellows to keep them from collapsing.

A round piece of wood, G, ¾ in. thick with a small groove cut in its edge, is glued to one of the sides F and a 2-in. hole bored through both pieces. Flap valves, O and J, made from soft leather glued to thin pieces of wood, are hinged to close over the openings as shown. These valves are held shut by light steel springs. A muslin bag,



Hand-Operated Suction Cleaner

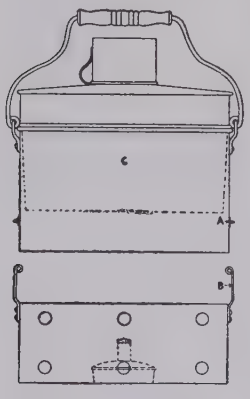
K, is made large enough to fit over the round block G to which it is fastened

by tying into the groove with a piece of twine.

The action is as follows: Grasp the handles and force them apart; this draws the air and dirt through the slot A and when the handles are pushed together the air and dirt contained in the bellows are forced through the valve J into the muslin bag where the dirt is retained and the air liberated through the texture of the cloth. When the bag becomes filled with dirt, it can be easily removed and cleaned.—Contributed by R. H. Brockman, New York City.

Heating Attachment for Dinner Pails

Some years ago I carried my dinner pail to work and as this work was out in the open I had to eat a cold lunch. I finally had a tinsmith make for me an attachment for the bottom of my pail in which to carry a small alcohol lamp. Common rivets, A, were soldered on the sides of the pail to receive the loops, B, of the attachment. The alcohol lamp was made from an old shoe-blacking box with a small piece of tube soldered in for the wick. A small bottle of alcohol, costing 5 cents, would heat my dinners for six days.



When dinner time came I would pour into the lamp a little of the alcohol and light the wick and put the attachment in place. Inside of 5 minutes my tea would be boiling hot and if left for about 15 minutes the whole contents in the upper compartment would be nice and warm.—Contributed by J. E. Noble, Toronto, Can.

Place a tin sleeve in the neck of an ordinary bottle, put in a wick of twisted cotton and fill with kerosene to make a practical and cheap torch.

A One-Piece Ventilator

A simple design of a one-piece ventilator or chimney top is shown in the accompanying sketch. Figure 1 shows a

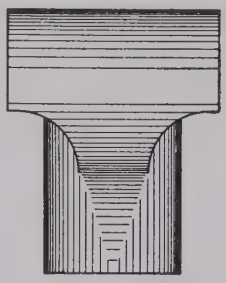


Fig 1

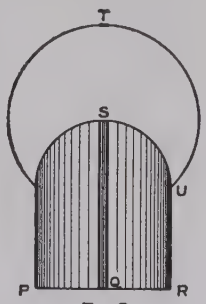


Fig 2

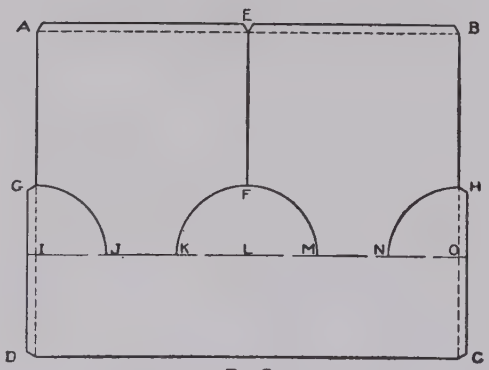


Fig 3
Laying Out the Metal

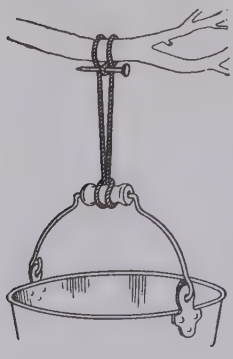
side view and Fig. 2 an end view, while Fig. 3 shows the size and manner of cutting the metal which when formed up makes a complete ventilator.

In laying out the metal, first draw line D C as shown in Fig. 3, making its length equal to the circumference of the base, the diameter of which is shown by P R in Fig. 2. Next draw the line I O. The distance from the base up to this line (I D) can be varied somewhat to suit the size of the ventilator and also the size of the sheet metal at hand. For a ventilator whose base is 6 in. or less in diameter, 4 in. will be sufficient for this height, but if the base is more than 6 in. in diameter, the distance should be increased to 6 or 8 in. Divide the line I O into six equal spaces at I J, J K, K L, etc., then with a compass with the radius set equal to the length of one of these

spaces, draw the arcs G J and N H and the semicircle K F M, using the points I, L and O as centers. The diameter of the top should be about one and one-third times the diameter of the base. The distances I A and O B on lines D A and C B are made equal in length to the distance T U in Fig. 2. Connect A and B and draw E F perpendicular to and bisecting A B and we have the complete layout. Allowance must be made for the seams as shown in the sketch. The edge A E is turned one way and E B the opposite, so when the piece is formed they can be grooved together as shown at T, Fig. 2. The edges G D and H C are treated in the same manner. Before cutting the piece and turning the edges, it is best to run the sheet through a pair of rollers both ways forming it up to about a three-quarter circle each time. This takes all the kinks out of the sheet and makes it form up more smoothly. The heavy lines in the sketch indicate where the sheet is to be cut when ready to be formed.—Contributed by H. M. Sanders, New Haven, Conn.

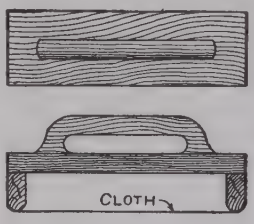
Rope Hanger for a Fruit Picker's Pail

Fruit growers will find the kink illustrated to be all that is desired for holding a pail or a basket to the limb of a tree while they are picking and throwing the fruit into the hanging receptacle. A stout cord or small rope is spliced into a ring or loop and this is given a loop around the bail as shown in the sketch. The other end of the rope is thrown over a limb and passed between the intervening strands and held with a common nail. This rope has the advantage over a hook, as it is easier to make and when made will fit any size limb.



A Home-Made Shoe Polisher

The rag as used by a bootblack in putting a finished gloss on shoes is rather difficult to manipulate when polishing one's own shoes. The device herewith illustrated is designed to overcome this difficulty by keeping the cloth taut and also providing a handle so that it can be used in the same manner as a brush.

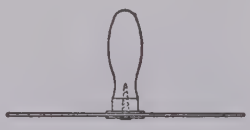


Four blocks of wood are necessary in making the polisher. The main body piece ¾ by 3 by 10 in., the handle ¾ by 1½ by 8 in. and the two end pieces each ¾ by 1½ by 3 in. The end pieces should be rounded on one edge and the whole assembled as shown in the sketch.

The cloth should be stretched tightly between the two end blocks and secured to the ends of the large block with large headed tacks.—Contributed by Ray L. Moyer, St. Louis, Mo.

A Home-Made Plumbers' Force Pump

Sink pipes sometimes become clogged with waste matter and they are very difficult to clean without a plumbers' pump. The little device shown in the accompanying sketch will answer the purpose very well and is made as follows: Secure a round piece of rubber about 6 in. in diameter and 1-16 in. thick and punch a ¼-in. hole in the middle of it. Fasten it to a file handle by means of an ordinary wood screw and a couple of washers as shown. To operate, place the rubber disk over the outlet pipe and fill the sink about half full of water, then raise and lower the handle a few times and the obstruction will be forced out.—Contributed by J. H. Byers, Little Rock, Ark.



How to Make Bent-Wood Sleigh Runners

(Condensed Article from Blacksmith and Wheelwright)

The process for making bent-wood sleigh runners is about the same as for any other bent-wood work, the first thing necessary is to get out the wood for the runners. The blanks should be worked closely to the size with only enough material left on them for "cleaning up" after the bending has been done. The wood selected should be straight-grained and free from knots, shakes and rot. Only good, clean, "live" lumber should be used for bent work. Lumber that has dried on the stump should not be used. Worm-eaten lumber will not bend satisfactorily. The next thing is to make up a form over which the runner is to be bent. If only a few runners are required, bits of board can be nailed to the floor or wall to form the outline of the runner as shown in Fig. 1. If you have a pattern runner, place it upon the floor or wall and mark around the outside with a pencil or scratch awl. If there is no pattern runner to be had, a drawing is made on the floor or wall full size of the shape required for the runner. Nail down several pieces of board, each marked C, Fig. 1, against the drawing or pattern runner, then make other pieces, BBB, which have been cut to the required curves so they will fit as shown. The beauty of the runners will depend upon the location of these pieces for placing in the steamed wood. See that the mould has perfect lines if you want to secure good bent work. If a form is to be built to accommodate quite a number of runners, two stout side frames will be required with crosspieces to take the place of the pieces of board shown in

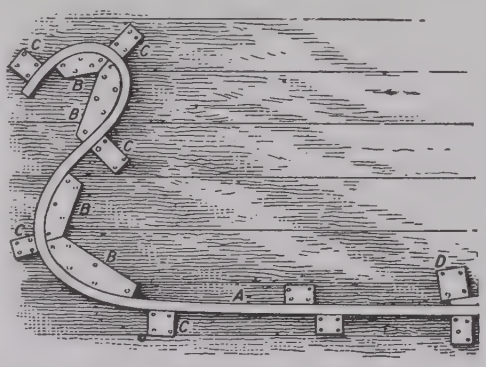


Fig. 1—Blocks Nailed to the Floor

the illustration. The wood is sprung between these blocks or forms after it has been softened by steaming.

A box must be made in which to steam the pieces of wood to be bent, and it must be large enough to take in the required number of pieces for the runners. A good design of a box is shown in Fig. 2. This box is made of 2-in. lumber with the top and bottom boards rabbeted on both edges to receive the two side pieces. Nails or spikes may be used to hold the planks together, but a much better way is to make several clamps, each consisting of two bolts and two pieces of board, and place one every 15 to 24 in. along the length of the box. Both ends of the finished box are squared up and closed with a plank cut to the size, using felt or gunny sack in the joint to make it

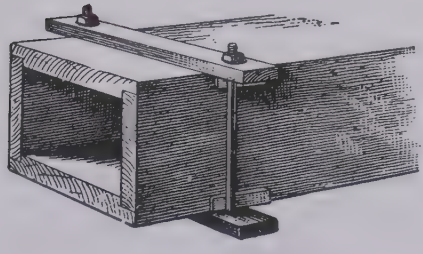


Fig. 2—Steaming Box

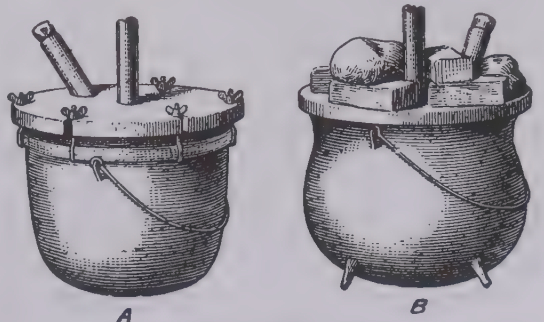


Fig. 3—Steam Generators

as tight as possible. A heavy weight or bar of metal set against each end will be sufficient to hold them in place when steaming the wood.

If there is no boiler in the shop for supplying the steam, a steam generator can be made of a common cast-iron or steel kettle. The kettle may be fitted with a cover clamped down with screws, by shrinking on a band as shown in the sketch, A, Fig. 3; or the cover may be laid on top of the kettle and held in place by a pile of bricks or junk, as shown in the sketch B. The steam pipe is fastened securely into the plank head, which had better be made up of several thicknesses of thin boards with the grain crossed each time and securely bolted together. This will prevent the excessive warping of the cover which is very apt to happen if a single thickness of plank is used. Do not overlook putting in a filling tube. This is shown in both sketches, A and B, Fig. 3, with the end closed by a plug.

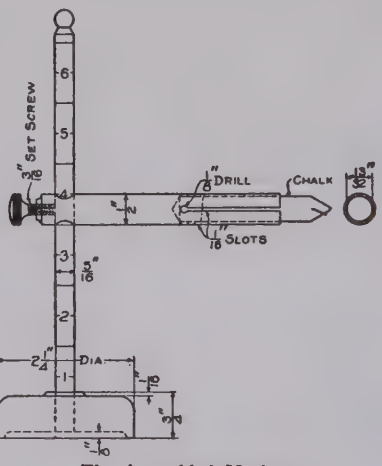
The steam pipe leading to the steam box is shown in both sketches. As there is practically no pressure, iron pipe, sheet iron or tin may be used for the steam pipe. Galvanized rain water conductors can be used and no valves are necessary in making connections.

Bore a hole in the bottom side of one end of the steam box and arrange this end a trifle lower than the other end. The hole will permit the water of condensation to escape. Steam should not escape from the box when a charge of wood is being softened. Steam which escapes from the box in the form of vapor has done no work whatever, and is just so much waste of fuel. In order to give up its heat to the wood the steam must condense and come away from the box as water. Therefore, in steaming a charge of pieces in the box, never crowd the steam kettle so hard that the steam escapes around the head of the box or through any other joints. The steam should be supplied to the box just as fast as it condenses, and no faster. When the pieces are placed in the box they should be so arranged that the steam can find ready access to all sides of each piece.

When taking the steamed pieces from the box do not lose any time in securing them to the forms. Do not take out more than one piece at a time, as it must be bent to the moulds immediately after taking it from the hot steam. The time of steaming will vary with the size of the pieces. Strips ¼-in. thick may be steamed in 15 to 20 minutes, while large pieces may require several hours to become soft enough to bend.

How to Make a Skirt Marker

Make a cast-iron base according to the dimensions given in the accompanying sketch. Drill a 5/16-in. hole in the center and finish the piece all over. The spindle is made out of a

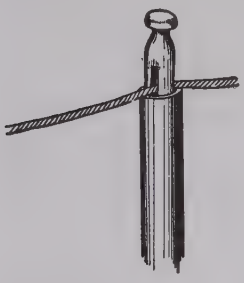


The Assembled Marker

cold rolled steel rod 5/16 in. in diameter and of suitable length. Grooves or marks can be cut around it ½ in. apart to facilitate the setting of the marker to the proper height. They can be numbered as shown, if desired. The crayon or chalk holder is made of ½-in. rod and should be drilled, tapped and slotted as shown in the sketch. The crayon is held in place by the four fingers formed by slotting the end after it is drilled. Either a knurled or a thumb screw can be used in the end for a set screw. The parts can be made of brass or iron instead of cold rolled steel, if desired.—Contributed by Henry Weigand, Buffalo, N. Y.

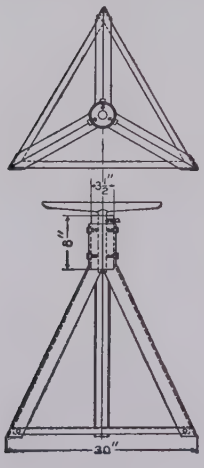
A Clothesline Prop

A serviceable clothesline prop can be made by taking a ¾- or 1-in. pipe from 6 to 8 ft. long, according to the height of the line, and laying the line across the end of the pipe and clamping it with a wood clothespin as shown in the sketch. If the pin is driven down as far as it will go, no wind or jar will cause such a prop to fall. When it becomes necessary to take the prop away the clothespin can be removed and the parts separated.—Contributed by R. M. Woolley, Ft. Casey, Washington.



Floor Stand Tool Rest for Wood-Working Lathes

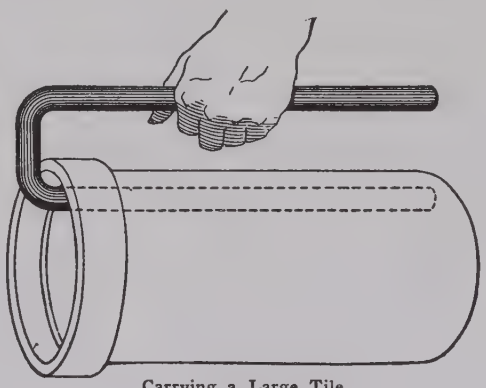
A good design of floor stand for a wood-working lathe is shown in the accompanying sketch. It is very strong and rigid, yet light enough to be moved about with one hand. The casting is 3½ in. in diameter and 8 in. long with a 1¼-in. hole bored through the center. The legs are made of 2 by 2-in. angles shaped at the top to fit the casting to which they are fastened by ½-in. cap screws. The bottom is braced with 1 by 1-in. angles which also serve as a rest for the foot when steadying the stand.—W. W.



A crumpled wire may be quickly straightened by catching one end in a vise and giving the other several hard jerks, using pliers to hold the wire.

Handle for Carrying Tile

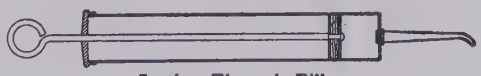
A handy device for carrying and laying sewer tile in sizes up to 10 in. in diameter is made from a piece of gas pipe, bent in the shape shown in the illustration. The material required is a piece of gas pipe ¾ in. in diameter and 4½ ft. long. Stick one end of the U-shaped pipe in the bell end of the tile and take hold of the outside part with the hand. A tile can be carried and placed in line with this handle very quickly.—Contributed by Bert La Rue, Girard, Kans.



Carrying a Large Tile

How to Make a Filler for Oil Cups

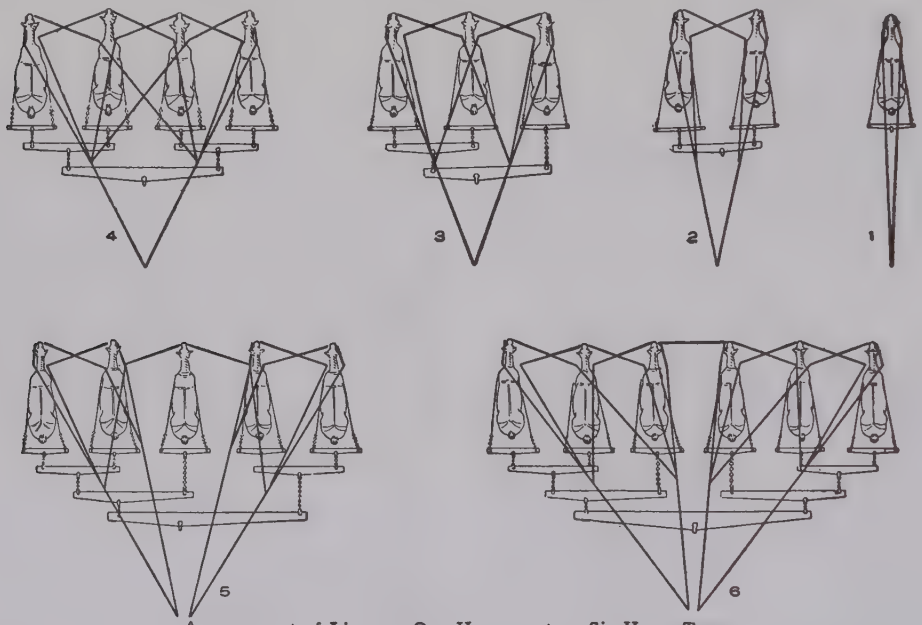
A small filler for oil cups, which will be found very handy around the engine room, can be made out of an old bicycle pump without much trouble. About all the change that is necessary is to fasten two washers the size of the barrel to the end of the plunger rod as shown in the accompanying sketch. These should be about ¼ in. apart and the space between filled with cotton twine. Then drill a hole in the end of the barrel and solder on a spout. It is used like a syringe in filling oil cups and it can also be used for cleaning out dirty bearings by squirting gasoline into the oil holes.—Contributed by Thomas A. Scott, Walkerton, Can.



Section Through Filler

Arrangement of Lines, Single-Trees and Eveners When Driving Horses

There are differences of opinion regarding the correct arrangement of eveners and single-trees, and in particular the lines or reins. The latter depending much upon the temper of the horse. The writer is acquainted with a farmer who drives several horses abreast without the use of lines or whip, having trained them to go, back, and turn by queer sounding calls.



Arrangement of Lines on One Horse up to a Six-Horse Team

Another farmer drives six horses abreast with a single pair of lines attached to the outside horses, the inside horses being connected with single straps.

The methods of harnessing up from one to six horses abreast are shown in the sketch which have been approved by several farmers that have had several years of experience. The methods shown are for plows, scoops or road-scrapers. When connecting to wagons the only difference is in the design of the last evener, which has a hole in the center for connecting to the pole or tongue instead of the chain hook. Single-trees and eveners for wagons are usually made about one-third heavier than for plows, keeping the same lengths throughout. It will be observed by the arrangement given no horse is able to shirk his duty without being detected. In such a case, the evener will turn in favor of the horse working best, thus enabling the driver to pick out the guilty one.—Contributed by I. G. Bayley, Haddonfield, New Jersey.

Heaters to Prevent Freezing of Sprinkler Systems

Recently an automatic sprinkling system was installed in the shops and car houses of the Chicago & Milwaukee Electric Railroad. The controlling valves for the sprinkler piping system are closely grouped at one end of a car-house bay and it is especially necessary that every precaution be taken to prevent the freezing of these valves, both on account of their first cost and because of maintaining the sprinkler system in working condition. For these reasons the valve group has been enclosed in a tight fitting wooden compartment in which an electric heater

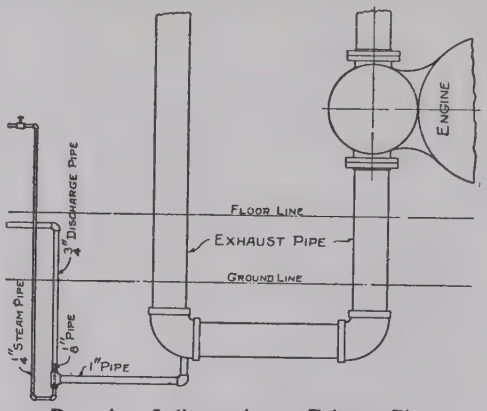
is installed, says Electric Railway Journal. The heater takes its supply of current from the shop circuit and because it is tightly enclosed in the wooden covering with the valves, some means was desired to give a positive indication to the watchman that the heater is at all times in working condition and thus protecting the valves from freezing. To serve this purpose a red bull's-eye from a signal lamp is set in the side of the compartment enclosing the valves and behind this bull's-eye a low candlepower lamp has been placed. Current for operating this lamp is obtained by connecting the leads from the lamp to the heater circuit, using a portion of the heating coils as a shunt for forcing enough current through the lamp to keep it lighted; thus, whenever the watchman passes near the controlling valves for the automatic sprinkler system he can readily note whether or not the lamp behind the bull's-eye is burning, and if so, he may feel assured that the heater within is protecting the expensive valves from frost.

In connection with this sprinkler system there is a pressure tank supported on a high tower in the shop grounds. The intake and discharge pipes to and from this tank are enclosed in a wooden box reaching from the ground to the bottom of the tank. To protect these pipes from freezing, another heater has been installed and similarly a lamp shunted across the heater circuit is installed behind a bull's-eye which, when illuminated, can be seen from the shop.

Removing Muddy Water in an Exhaust Pipe

The accompanying sketch shows the arrangement of a simple steam jet for removing muddy water, etc., from a steam pipe that cannot be drained in the usual way. The sketch shows it connected to the exhaust pipe of an 80-hp. engine, but it can be used in a number of other similar places as well.

Into the side of a 1-in. tee connect a 1-in. suction pipe, about 3 ft. long will do for ordinary purposes, using a nipple and ell at the connection of the pipe to be drained so that the suction will be downward. Bush the lower end of

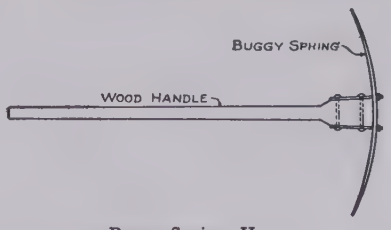


Removing Sediment in an Exhaust Pipe

the tee to ¼-in. for a steam pipe connection. The ¼-in. steam pipe should be reduced in the bushing for a ⅛-in. pipe which should extend through the tee into the discharge pipe about 3 in. A ¾-in. pipe should be used for the discharge.—Contributed by C. L. Payne, Shellman, Ga.

A Light Grubbing Hoe

A light grubbing hoe for use about the garden or truck patch is shown in the accompanying illustration. Secure a leaf out of an old buggy spring, about 18 in. long, and cut the ends off square and grind them sharp. Two short pieces of strap iron with holes for rivets and one end of each upset and threaded for a nut, will be needed to fasten the spring to the handle, which should be



Buggy-Spring Hoe

of wood. Assemble as shown in sketch and you will have a very handy little tool for light work.—Contributed by John A. Wolfgang, McAllisterville, Pa.

Effect of Expansion in a Stack

In examining a large stack of an ingot heating furnace at one of the steel plants, it was discovered that the joint at the point A A shown in the sketch

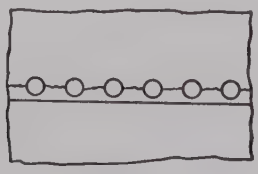


FIG. 1

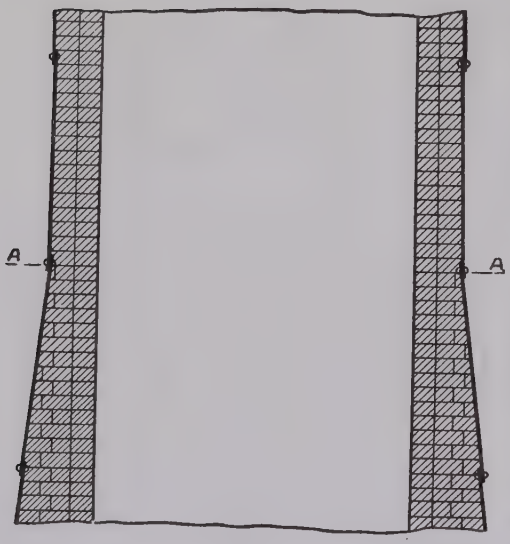


FIG. 2

Break Caused by Expansion

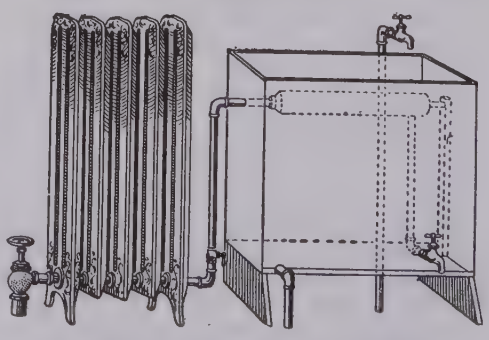
had become separated by one of the rings tearing between the rivet holes as shown in Fig. 1 and that this ring was about 1¼ in. higher than its original position. It is evident from the above that the upper part of the stack above joint A A has risen through a height of 1¼ in., due to the expansion of the brick lining, the latter having also been the cause of the separation of the rings.

It is probable that the stack has been in this condition for quite a long time without having been noticed, and has been continually raising and lowering itself as the brick lining expanded or contracted. It certainly is a remarkable thing that the stack has not fallen over, as there were some very heavy storms in the locality.

The stack will be repaired by securing a band around the separated joint by means of a double row of tap bolts fitting in slotted holes which will allow for the expansion and contraction of the rings.—Contributed by Walter J. Cummer, Bethlehem, Pa.

A Still for Condensing Steam from a Steam Radiator

Distilled water is always required for the dissolution of chemical solids. Water taken from a well, or even rain water, may contain such elements as will act upon the chemical being dissolved in such a way as to render it unfit for the use intended. Classrooms in schools and colleges are always provided with small stills for distilling water to be used in making up solutions in the study of chemistry. The class in one school desired to have plenty of the distilled water on hand at all times and, with the aid of a local plumber, they rigged up an arrangement that would condense the steam taken from a steam radiator to supply a large quantity of distillate. The plumber tapped the steam heater pipe and connected it with a condenser which was fastened in a tank. The condenser consisted of a 2½-in. pipe, reduced at one end for connection with the steam radiator and capped on the other. A hole was drilled on one side



Distilled Water Taken from the Radiator

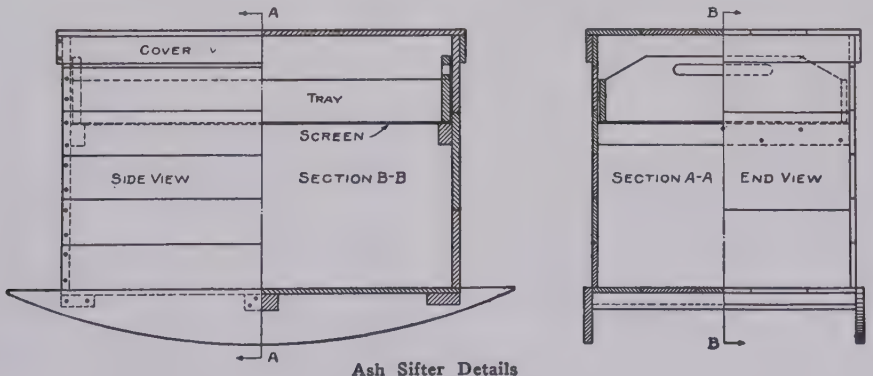
near the capped end and connections made for carrying the distilled water

out through a tap on the outside of the tank.

The tank is of zinc, filled with cold water and kept cold by a small stream of water flowing from a tap. The overflow is carried away through pipes to a sewer.—Contributed by C. D. Luther, Grand Rapids, Mich.

How to Make a Dustless Ash Sifter

Secure a cereal box of your grocer about 2 ft. wide, 2 ft. deep and 3 ft. long, a few inches variation either way from these dimensions will not matter. Go over it carefully and tighten up all the nails, then make a cover, with about 3-in. sides, that will fit closely over the top as shown in the accompanying sketch. Handles can be put on the cover if desired but it is not necessary. Make the tray to fit in loose so it can be taken out easily. The end pieces should be made with hand holes cut in as shown in the end view. The screen is made of ¼-in. wire netting and fastened to the bottom of the tray with double pointed tacks. On the inside of the box nail two strips as shown to hold the tray in place. Now get two 1-in. boards of suitable length and width for the rockers. Lay out the curves with about a 5-ft. radius and cut them to shape with a hatchet and draw-knife. Three cleats should be nailed to the bottom of the box to stiffen it and to support the rockers which should be nailed to them securely.

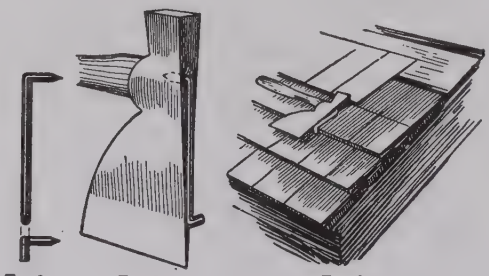


Ash Sifter Details

This sifter will sift two or three scuttles of ashes at one time with very little work, and no dust, if it is properly constructed. The ashes should be cold to get the best results.—Contributed by J. C. Judkins, W. Medford, Mass.

Shingle Gauge for a Hatchet

There are many places on a roof where it is not practical to lay shingles to a chalkline or straightedge, which makes it necessary to use some kind of

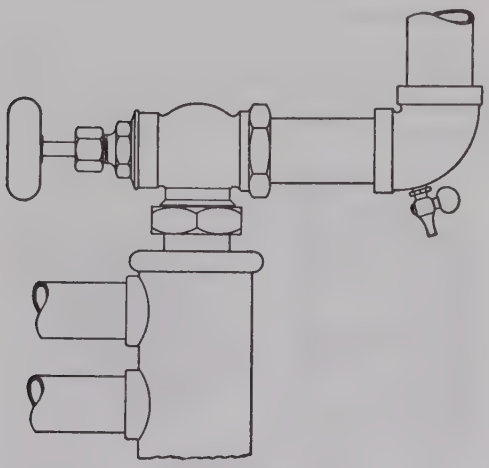


Hatchet Shingle Gauge

a gauge. Instead of having a special gauge for this work, one can be attached to the shingling hatchet as shown in the accompanying sketch. The gauge consists of a piece of wire bent as in Fig. 1 and attached to the hatchet by driving the sharp end into the end of the wood handle, Fig. 2. A staple is also driven over the wire to keep it from turning. The method of using the gauge is shown in Fig. 3. The length of the wire will depend upon the number of inches the shingle is to be exposed to the weather.—Contributed by H. J. Weiss, Bessemer, Alabama.

How Freezing Was Avoided in a Steam Pipe

The accompanying sketch shows how to overcome the annoyance and trouble caused by return steam pipes



Pipe Drain

freezing on account of a leaky valve at the boiler, says the Wood-Worker. This valve seat in one instance became worn and could not be closed tightly and as it was not convenient to close down during the week to make repairs the steam pipe was tapped at the lower elbow and a pet-cock attached and at night when the steam was shut off at the boiler the valve at the coils was also closed and the pet-cock opened, which let all the condensed steam out, instead of into the pipes where it would collect and freeze in the return pipe. This proved to be a very satisfactory arrangement until time could be found to grind the valve at the boiler. This may be of some benefit to others who may not want to let their steam run all night and are troubled with water in the pipes freezing.

How to Find the Candlepower of Any Light

To compare the illuminating powers of any lamp and a candle the following method can be used: Place a small upright rod in front of a screen, as shown in the accompanying sketch. The screen can be made of cardboard fastened on feet to hold it upright on the table. Place the candle so that a shadow is cast by the rod on the screen. Now place the lamp in such a position that another shadow of equal depth or degree of darkness is cast alongside the first. Measure the distance (D_1) from the candle to the screen and the distance (D_2) from the lamp to the screen.

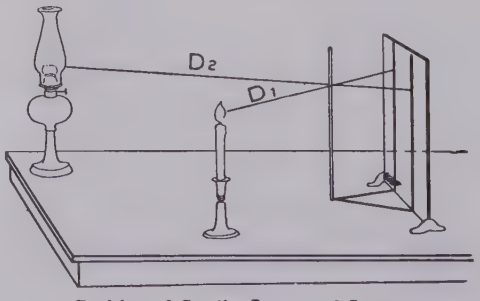
If I_1 and I_2 denote the illuminating powers of the candle and the lamp respectively, I_1 and I_2 will be proportional to the intensities of the illuminations produced by the candle and by the lamp respectively at a unit distance.

When I_1 is the intensity of illumination produced by the candle at a unit distance, $\frac{I_1}{D^2_1}$ = the intensity of illumination at a distance of D_1; and when I_2 is the intensity of the illumination produced by the lamp at a unit distance, $\frac{I_2}{D^2_2}$ = the intensity of the illumination of the lamp at a distance of D_2, but the intensity of the illumination produced by a candle at the distance D_1 equals the intensity of illumination produced by the lamp at a distance D_2. That is

$$\frac{I_1}{D_1^2} = \frac{I_2}{D_2^2} \text{ or } \frac{I_2}{I_1} = \frac{D_2^2}{D_1^2}$$

If the candle is a standard one, the illuminating power of the lamp = $\frac{D_2^2}{D_1^2}$ candlepower.

The rule is: Square the distance of the lamp from the screen and divide



Position of Candle, Lamp and Screen

by the square of the distance of the candle from the screen and the result will be the candlepower of the lamp.

Shaping Pattern Gear Teeth on a Lathe

It is a very slow and difficult task to work out teeth by hand for a large gear pattern and have them all exactly alike and correct. The accompanying sketch shows a device whereby they can be shaped on a lathe, thus making the work much easier and saving considerable time. First work out a tooth to the pitch wanted, making it about twice the length of one tooth. Now cut out a recess the exact length of tooth and drive two brads into the body piece and sharpen the heads as shown in Fig. 1. Next turn up a spindle of a suitable diameter and length and cut out a recess as wide as the tooth is long and deep enough so that when a piece of sandpaper is glued on, it will be flush with the rest of the spindle, as shown in Fig. 2. A tooth is cut out roughly on a circular

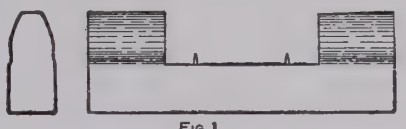


Fig. 1

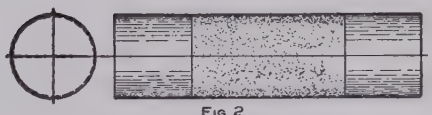


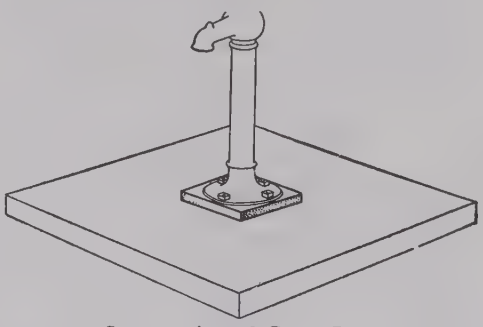
Fig. 2

The Tooth Form and Sandpaper Roll

saw, then inserted in the first piece described, the brads holding it in place. When holding the tooth against the revolving spindle in the lathe, it can be worked out to the desired shape in a very short time and every tooth will be exactly alike.—Contributed by Fred Ambrose, Stevens Point, Wis.

Keeping Waste Water Out of a Well

A good method to prevent waste water from running back into the well or cistern is shown in the accompanying sketch. A cement boss 1 in. thick is put around the pump hole and over the well cover. The boss should be a little larger than the diameter of the foot flange on the pump. This boss can be applied to a flagstone as well as to a cement stone.



Concrete Around Pump Base

A tin or wooden box can be fitted in the pump hole to act as a core. This is a cheap and good method which can be applied by any one. The boss requires only a shovelful of mortar and a few minutes' time in making.—Contributed by Arch Owen, Youngstown, Ohio.

A Simple Pipe Hanger

There are a great many different devices used for hanging gas or water pipes to the under side of I-beams that support concrete floors, but the one shown in the accompanying sketch will be found to be very simple and easily made and to answer the purpose for which it is intended very well. All that is necessary is to secure some ¼ or ⅜-in. round iron wire and bend it as shown in Fig. 1. To secure it to the I-beam, place it in position, then ham-

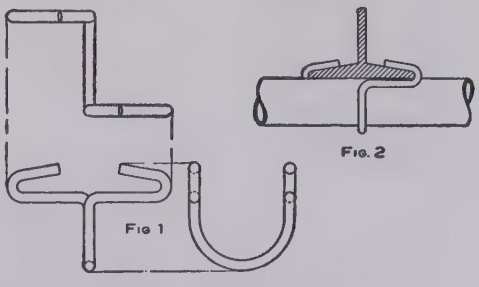


Fig. 2

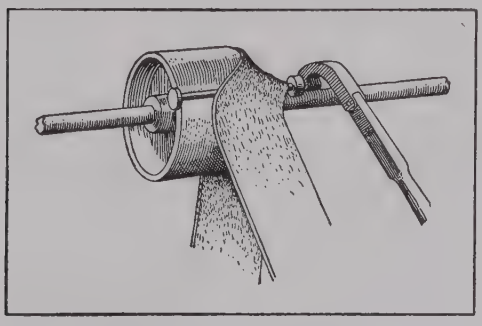
Fig 1

Bent Wire Pipe Hanger

mer the ends until they are tight. Fig. 2 shows an assembled view of the hanger.—Contributed by Vary Mengle, Scranton, Pa.

A Belt Shifter

The belt pole shifter construction, as shown in the illustration, is very popular in Germany, says American Miller.

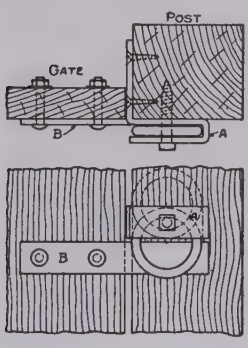


Putting a Belt on a Pulley

The making of this shifter is quite simple and will be readily understood from the sketch without any further description. The general make-up would seem somewhat heavy, but apparently it is perfectly adapted to the purpose intended.

A New Gate Latch

A new style of gate latch which is very simple in construction and neat in appearance is shown in the accompanying sketch. To make it, two pieces of 1-in. strap iron, about 8 in. long, and a ring about 2 in. in diameter are needed. Bend one of the straps as shown at A, one end to fit about the post and the other around the ring. Drill holes in it for the wood screws and the lag screw. The lag screw holds the ring in place and also helps to hold the strap to the post. The lower strap is straight and has two holes drilled in it for bolts which fasten it to the gate. When it is desired to open or close the gate, the ring is raised, as shown by the dotted position in the sketch, so as to allow the lower strap to swing in or out from the gate post. This makes a strong latch and one that does not easily get out of order.—Contributed by Bert La Rue, Girard, Kan.



Sawing Frozen Lumber

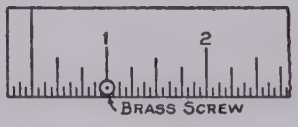
In sawing frozen lumber, the sawdust has a tendency to slip by the throat of the tooth, stick on the lumber and bind the saw which throws it out of true, especially so with an inserted tooth saw. This requires a specially made shank, at least two gauges thicker than the saw plate, when using inserted toothed saws.

When fitting up a new set of teeth, first put in the new points then go all around the saw and make the shanks even with the points, says a correspondent of the Wood-Worker. Side file each tooth to a gauge, and if the bit does not set straight in the plate, take it out and file where the shank bears until it does set straight, then put the saw on the mandrel, run slowly and hold a piece of emery wheel against the teeth until they all strike. Care must be taken to keep from knocking off the corners of the teeth and also have them square. If all of this is done the saw is quite sure to run well, provided the other parts are right.

In cold weather it is quite important to keep the corners of the thick shanks square, having the teeth side dressed to a gauge, with the widest part at the extreme point, and the saw rounded so all the teeth cut alike.

Preserving Wooden Rules

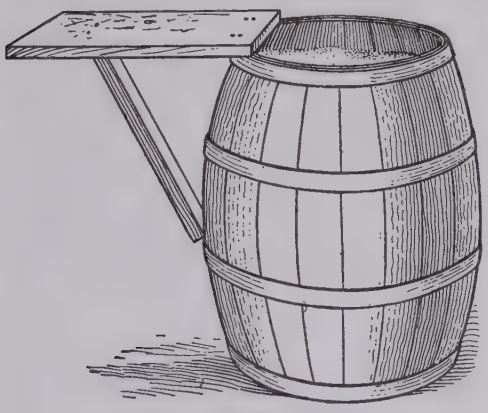
Wooden rules such as are used by carpenters and patternmakers are in time badly marred and worn by the constant pricking of the divider or compass points in setting off dimensions. The accompanying sketch shows how this may be avoided. Drill a small hole through the rule on the 1-in. line and screw in a short brass



screw which is then filed off flush and smooth with the rule on both sides. Make a small mark with a prick punch in the center of this screw, then one leg of the divider can be set in this center mark while the other is opened to the required dimension.—John Andrews.

A Barrel Shelf

The groceryman receives a large portion of his goods in barrels and the clerk finds it quite a task to make up sugar and rice into packages for the trade. Herewith is illustrated a little device that will greatly assist him when

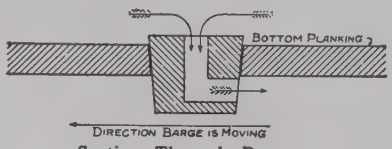


Shelf Fits Any Barrel

filling paper bags with the product contained in a barrel. The shelf is made of a board having a width that will about cover one-quarter of the barrel rim. Four nails are driven through one end of the board to allow the ends to pass down on each side of the hoop and staves. A brace is attached to the other end so it will rest on one of the lower hoops.—Contributed by Don C. Higbee, S. Omaha, Nebraska.

A Siphon Bilge Pump

The method of draining barges of bilge water by means of a siphon plug in the bottom is shown in the accompanying sketch. This scheme will work equally well on any power-driven craft that has a speed of 4 miles an hour or more. A hole is bored nearly through the plug then another bored at right angles to the first through the side, near the bottom, as shown in

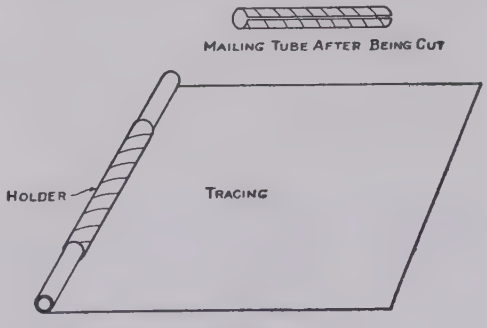


Section Through Pump

sketch. The plug is then placed in the bottom of the barge to be drained with the hole in the side pointing aft, says a correspondent of Motor Boat. When the barge is in motion the hole in the plug is uncorked and the water will be drawn or sucked out.

Tracing Holder

Very often draftsmen experience considerable difficulty in handling a large tracing on a small table top. This can be easily overcome in the following manner: Take an ordinary mailing tube of convenient length and diameter and cut a slit from ⅛ to ¼ in. wide along its entire length and after rolling up the portion of the tracing not needed for immediate use, slip the tube over the roll, leaving the part to be used outside the split. This will prevent the necessity of leaving the tracing hang over the corner of the



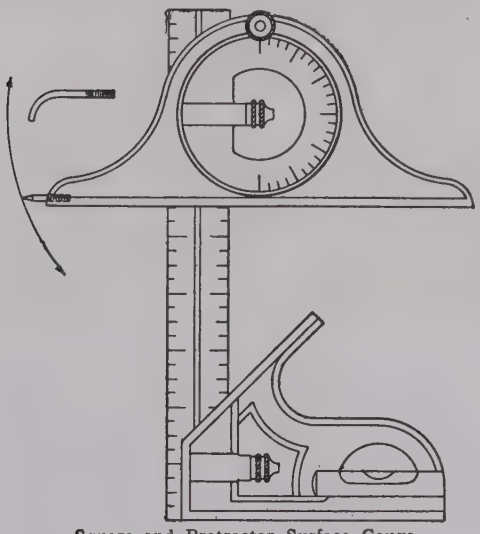
TRACING HOLDER IN USE

table and facilitate shifting it, thereby decreasing the possibility of breaks or creases.—A. J. Willison, Jr., Bramwell, West Virginia.

Do not run an automobile along in the car tracks as this grinds down the edge of the tire.

A Quickly Made Surface Gauge

A surface gauge made from a combination square and protractor head is shown in the accompanying sketch.



Square and Protractor Surface Gauge

Two short pieces of ⅛-in. steel will be required. One piece should be pointed at one end and threaded at the other. The other piece should be bent in the form of a caliper leg as shown in sketch and also threaded at the other end. The protractor head should be tapped ⅛ in. to receive either of the pieces as required. The two adjusting screws on the protractor head come in very handy in setting the points to any required height.—Contributed by T. Gregson, Lachine Locks, Canada.

Pipe Coil Water Heater for a Stove

When making a coil for the fireplace of a stove use a piece of 1-in. lap-welded pipe and in bending be sure that the weld is on the upper side, says the Metal Worker.

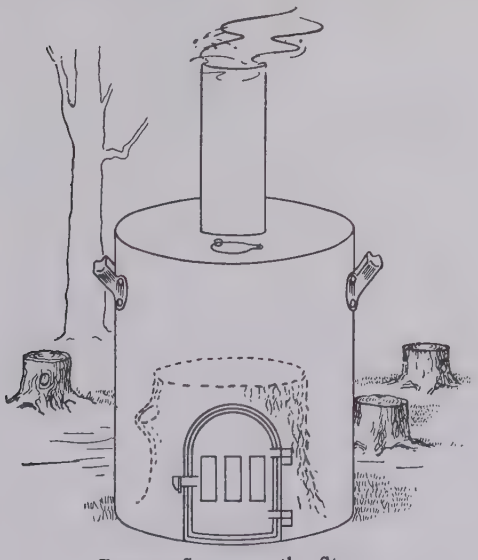
It will be well to cut long threads on the ends which extend through the stove so that a lock nut can be used both on the inside and on the outside to make a tight fit and if an asbestos washer is used it will prevent the escape of ashes. The size of the coil will depend on the size of the radiator used. A radiator having 50 ft. of surface will require a heating coil with about 3 ft. surface, in order to take care of the radiator surface exposed in the return and flow pipes. This means a pipe 9 ft. long. If the coil is arranged so that it enters the stove on one side and extends around at the top of the fire chamber so the hot coals lie against it, and then on the opposite side to the point of entrance it rises alongside the door and the remainder of the surface is coiled above the fire and the outlet end is carried up near to the top of the stove before passing out, the heating capacity will be materially improved over exposing the entire coil above the door which might at times be left open to check the fire. This arrangement of the coil in the stove will avoid interference with putting coal on the fire.

If the coil is put in the stove, some method of checking the draft instead of opening the door should be provided even to the extent of making a tee joint in the smokepipe with one end of the tee to be closed with a tight damper or opened as the draft needs to be reduced. After the pipe coil passes out of the stove, the flow main should run up to a point a foot or so below the ceiling where it should be connected into an expansion tank which will hold 3 to 5 gal. This will take care of the expansion of the water on heating and allow the air, which otherwise would accumulate in the pipes, to escape. The flow main could be connected with the tank and the hot water taken from the tank and carried along it with a gradual downward pitch until it connects with the radiator. The return pipe can be run back to the stove either in the ceiling of the basement beneath the floor or along the floor if the location of the radiator will enable this to be done in a manner which will not be unsightly or objectionable. At the low point there should be arranged a cock for emptying the system when necessary. If the return pipe is exposed in the cellar, it should be covered, so as not to give the heating coil in the stove more work to do than it can readily take care of.

SHOP NOTES

Burning Out Stumps

A satisfactory and inexpensive way of burning out stumps is to place a galvanized furnace, as shown in the sketch, over the stump and allow it to burn at leisure. This furnace is cylindrical and is made of sufficient size to cover the stumps. An ordinary joint of stove pipe is used for the smoke. A door of convenient size is made below to cover an opening that serves as a damper. The stump is covered with kerosene and a fire built near the door between the opening and the stump. The furnace may be turned with the wind, if necessary, to give the fire a strong, steady draft. This contrivance will burn out large stumps in a remarkably short time, leaving nothing but deeply buried roots, and



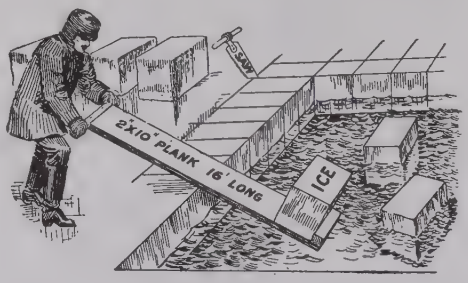
Furnace Sets over the Stump

sometimes the flames will burn these out at a great depth.—M. Wooley.

Never allow the weight of an automobile to rest on deflated tires.

Removing Blocks of Ice from a Pond

An easy way to take the blocks of ice from a pond after they are cut is

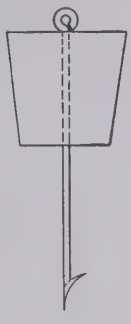


Lifting a Block of Ice

shown in the accompanying sketch. A plank, 10 or 12 in. wide and 16 ft. long, with a handle attached to one end and a block of wood nailed to the other, takes the place of ice tongs. One person can take out a heavy block of ice as easily as three men could with ice tongs. In removing ice blocks with this board, the operator will not get wet.—Contributed by L. R. Clarke, Elmhurst, Calif.

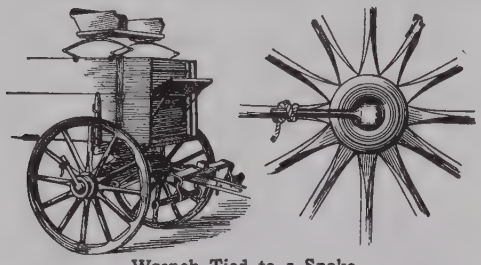
A Handy Milk Bottle Opener

A great deal of trouble is often experienced in taking the paper tops out of milk bottles. The little instrument here shown will do the work very nicely. Secure an ordinary fish hook about 1½ in. long and after heating it to a red heat bend it out straight as shown. Run the barbed end through a cork and this will serve as a handle. To use, pierce the paper cap with the hook so that the barb will catch on the under side when the hook is withdrawn and the cap will come out with the hook.—Contributed by Ralph L. LaRue, Goshen, N. Y.



Turning a Tight Wagon Wheel Nut

A wagon wheel nut that becomes too tight to be removed in the usual

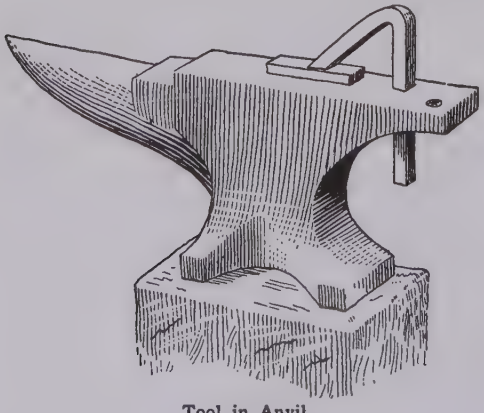


Wrench Tied to a Spoke

way may be loosened by the following method: Put a wrench on and fit it tightly to the nut and then tie a short piece of rope to the wrench handle and to one of the spokes in the wheel as shown in the sketch. Push the wagon backward a few feet and the turning wheel will loosen the nut. The nuts may be tightened in the same manner by pushing the wagon forward.—Contributed by P. A. Harlan, Norman, Nebr.

A Blacksmith's Holding-On Tool

The blacksmith finds it necessary at times to have someone to hold a piece of metal on his anvil, while doing some work that requires the use of both his hands. An extra person is not always at hand when wanted and this necessitates some device for holding the metal.



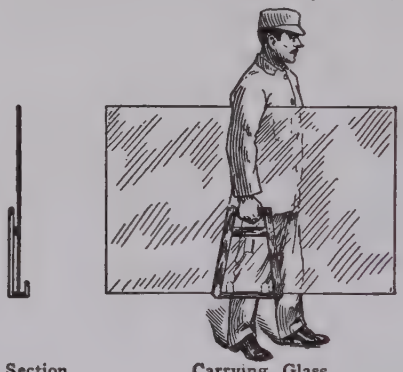
Tool in Anvil

Various appliances are used for this purpose, but the one illustrated herewith is simple to make and holds the metal well. The device consists of a square piece of steel bar of a size to fit the square hole in the anvil nicely and bent as shown.

When the square steel is driven down with a few blows, it binds in the hole and the spring of the metal will hold the work firmly to the anvil. A blow or two from a hammer on the bottom end releases its hold.—Contributed by John A. Cook, Birmingham, Ala.

Handle for Carrying Large Window Glass

A window glass that is wider than the length of a man's arm, say, 28 by 32



End Section Carrying Glass

in., is very hard to manage or carry by one person. The sketch herewith shows a little device I use for this purpose. It consists of a light wood frame with a handle at the top and a projecting piece at the bottom. A small cleat is nailed to the inside of the frame to press against the glass and hold the handle out far enough for it to be easily grasped by the hand.—Contributed by W. E. Morey, Chicago.

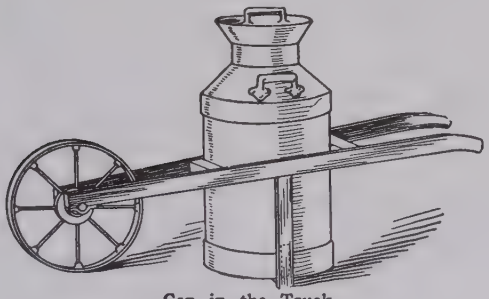
How to Lay a Large Rug

You are always telling the people about wrinkles and I am going to tell you how to get rid of them. When you lay a large rug you will take hold of the edge and pull away from the center obtaining nothing like first-class results. When a large rug is laid on a stage a stage hand will begin at the

center and sweep it with a broom toward the outer edge, removing the air beneath which will leave the rug as smooth as the floor. I have seen housekeepers try for some time to straighten rugs on oiled or polished floors and when I showed them our way they declared it the best they ever tried.—Contributed by W. H. Dilger.

Truck for Milk Cans

The accompanying sketch shows how an old wheelbarrow may be converted into a truck for carrying large milk cans. The body of the wheelbarrow is removed and pieces put in to hold the can. One man can handle



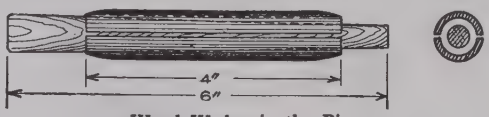
Can in the Truck

a 100-lb. can with this truck much easier than two men in the usual way.—Contributed by Chas. J. Allen, Bayonne, N. J.

How to Remove Dents from Gun Barrels

Secure a piece of gas pipe about 4-in. long and as near the diameter of the bore of the gun as possible and smooth up the outside with a file. Cut the pipe in two, lengthwise, with a hacksaw and file a slight taper on the inside of the pieces with a round or half-round file. Fit a hardwood plug slightly tapering to the pieces, making it 2 in. longer than the pipe.

Locate the dent in the barrel and place the pieces of gas pipe so one half piece will cover it and carefully insert the wood plug. When the pieces tighten against the walls of the barrel, drive the plug in with a heavy rod until the dent is forced out. Take a small smooth faced hammer, or, better still, a copper hammer and strike with light blows around the dent to smooth up

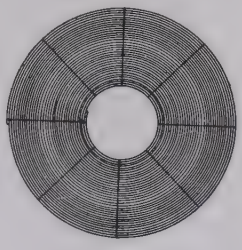


Wood Wedge in the Pipe

the surface. The gas pipe and wedge is then removed by driving from the opposite direction.—Contributed by W. C. Cleveland, Utica, N. Y.

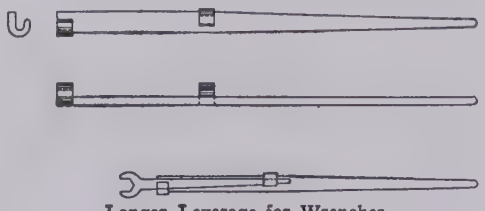
How to Prevent Friction Tape from Unraveling

Electricians often have trouble with friction tape because the outer edges unravel when the tape is unrolled. This can easily be overcome by scoring each side of the tape in radial lines with a sharp knife as shown in sketch. This cuts the outer threads of the tape and does away with the unraveling.—Contributed by H. S. Lee, Topeka, Kan.



Extension Bar for Wrenches

A handy extension bar for wrenches is shown in the accompanying sketch which will be found very useful on heavy work where the ordinary open end wrench will not start the nuts. It can also be used on bars when a longer leverage is required. It is 3 ft.



Longer Leverage for Wrenches

6 in. long and made of ¾ by 2 in. steel. Contributed by Urban A. Towle, St. Albans, Vermont.

Tool Box for Metal Workers

It is useless to provide stove men with a kit of tools unless they are also

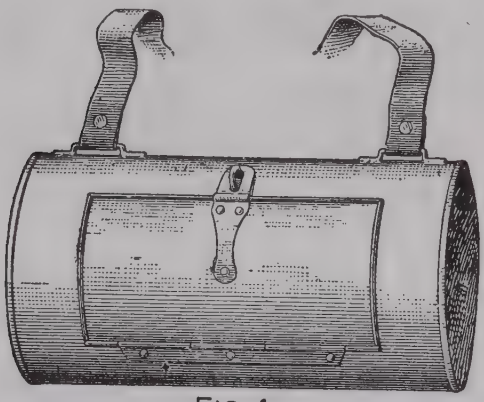


FIG. 1

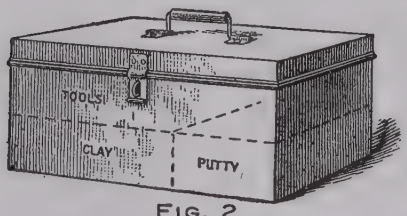


FIG. 2

Two Kinds of Tool Kits

provided with a suitable tool box or tool case, with a clasp to use a padlock to insure them against having any of their tools stolen, says a correspondent of the Metal Worker. Such a tool box is very easily made, and many men use an oval cylinder with a head on each end and a door on the side with a handle on the top by which it can be readily carried; and possibly rings in each end with a strap fastened so that the tool kit can be carried with both hands free for carrying stove pipe or a step ladder, as the case may be.

Some people use a round, others an oval, cylinder as shown in Fig. 1. The box or case should be large enough to carry all the necessary tools, but should not be so large as to permit the carrying of so many tools that it will be a burden, or to relieve the jobber of thinking what he will need for the various work which he is sent out to do, in which case he can remove the tools he does not require and can put in those which he will need for some special work. Another style of box is shown in Fig. 2.

Stove repair jobbers should also have drawers in the shop where they can keep their tools which are not in their jobbing case.

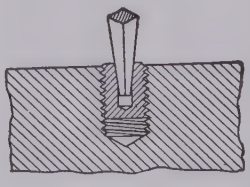
Black Oil Finish on Steel

Many articles are found in the market with the black oil finish. It is also known as the burnt oil finish. This finish is quite extensively used on hardware, particularly mechanics' tools, like wrenches, chisels, pliers and similar implements. While there are several methods of producing this finish, one of the best is the following:

The article to be finished is heated in a furnace to cherry redness, and then plunged into oil (preferably lard oil). The article is then removed and the oil burned off in the furnace, says the Brass World. After this has been done it is immersed in water. The oil must be kept cold when a large number of tools are to be treated, as the heat will cause it to burn. After the immersion in water, the surface will be found black and protected against rust. In order to bring out the best surface, a light film of linseed oil is applied to the article, and the excess then wiped off.

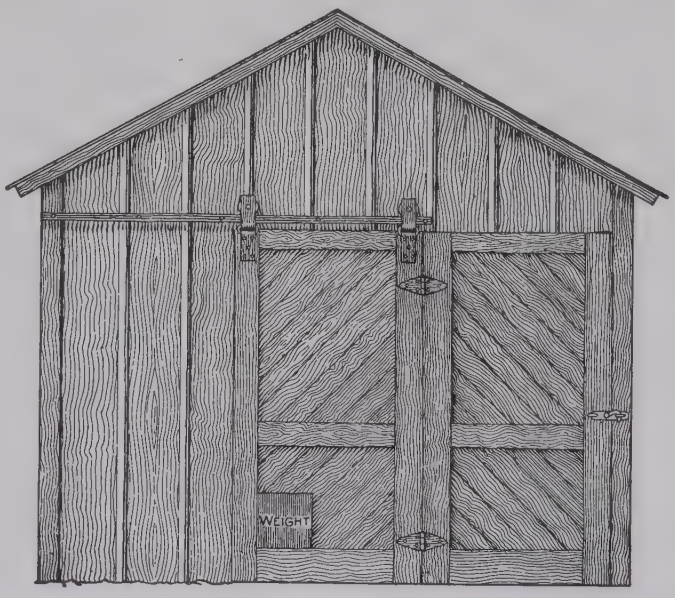
How to Remove Broken Screws

Most mechanics do not like the task of removing the ends of bolts and screws that have been broken off in the metal and they will usually try to chip or drill them out, thus spoiling the threads more or less. A much better and easier way is shown in the accompanying sketch. Drill a small hole in the stub and drive a square punch into it as shown. Now turn the punch with a wrench and the stub and punch will turn out together.—Contributed by Wm. Schoenberg, Chicago.



A Wide Garage Door Hung on a Short Track

A small garage that is only large enough to house an automobile must have a door almost as large as one end of the building. In such an instance the door was desired to be hung on rollers and the width of the garage would not allow for a track of sufficient length to hang an 8-ft. door in the usual manner. Instead of having one door, two 4-ft. doors were made and hinged together as shown in the sketch. One of these doors was fitted with rollers which run on a short track. The hinged door is opened and folded over the first door and then both of them rolled back over a 4-ft. space.



Short Track and a Wide Double Door

A 50-lb. weight was fastened in the lower left-hand panel of the door hung on the rollers to counterbalance the weight of the door hung on the hinges. A hook was placed in the cement floor on the inside of the doors at the center to secure them when they were closed.—Contributed by M. E. Tyler, Batavia, N. Y.

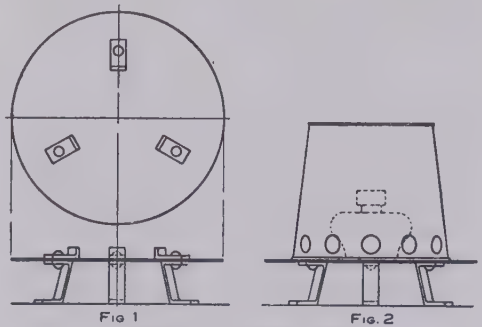
How to Temper Springs

Heat the spring to a hardening color, taking care not to burn the metal, and quench in oil. As soon as the metal has cooled so it does not "sizzle" put the spring back into the fire and keep it there just long enough for the oil to burn off, then quench in water.

This method is applicable to all springs, and especially small flat springs. This is a simple method and one to be depended upon and can be done anywhere with a stove fire and a little oil.—Contributed by Donald A. Hampson, Middletown, N. Y.

A Home-Made Oil Stove Heater

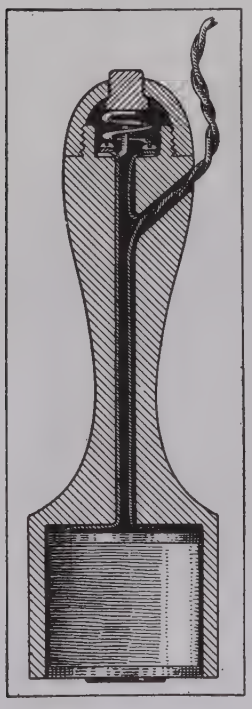
A very simple and easily made oil heater that will give off a surprising amount of heat for its size is shown in the accompanying sketch. The stand is made of a round piece of sheet iron with three bent pieces of strap iron riveted to it for legs as shown in Fig. 1. The little clips on top are for holding a lamp which should be one with a low base and a large round burner. A large pail with some holes punched in the top and turned upside down over the lamp completes the stove as shown in Fig. 2.—Contributed by J. H. Crawford, Schenectady, N. Y.



Made of a Metal Pail

Small Magnet for the Shop

In a certain small shop the nails and brads were kept in deep narrow tin cans and they were hard to get, especially when the nails ran low. To overcome this difficulty a small magnet was devised to be operated on a battery constructed of dry cells. A handle 4½ in. long was turned up from soft wood with one end large enough to bore a hole for the coil of wire. In the other a ½-in. hole was bored for a push button and the two holes connected with a ¼-in. hole for the wires. A double flexible cord of fine wires connected to the magnet coil and push button entered the handle through a hole in the side and several feet of its length were wrapped around a curtain roller that was fastened to the ceiling. The ends of the wire were connected to the caps on the curtain roller and the copper supports of the roller ends were connected to the battery terminals. The curtain roller keeps the magnet out of the way, yet in reaching distance where it can be grasped by the hand and placed in any can of nails. A pressure on the push button causes the magnet to pick up a quantity of nails and hold them until the button is released.—Contributed by Homer Deakman, Wichita, Kans.



The heat unit value of the volatile matter contained in the various coals has a wide range depending upon the carbon and hydrogen content.

Handling Frozen Explosives

It is at this season of the year that those in charge of rock blasting should see that the men under them handle explosives properly. With black powder the care ordinarily exercised should be continued. This explosive is not affected by the cold weather, but with dynamite and Judson powder extraordinary care must now be exercised, as these explosives freeze, owing to the nitro-glycerin that they contain.

As the percentage of nitro-glycerin in Judson powder is small, the danger from it is not so great as from dynamite, which contains 33 per cent or more of nitro-glycerin. When Judson powder becomes frozen it will cake in the sack, but it also cakes from other causes. Only a little heat is necessary to allow it to be readily broken up by the hands and placed in the blasting hole. Owing to freezing and thawing free nitro-glycerin can leak from the powder, but not as readily as from dynamite.

In the case of dynamite this is the great danger from freezing, and not only should dynamite that is frozen be handled with the utmost caution, but also that which has been thawed out. The fact is that there is greater danger from the dynamite after it is thawed than when it is in its frozen state, for then the nitro-glycerin leaks from the absorbent used in the dynamite.

Nitro-glycerin in dynamite freezes at a temperature of from 42 to 46 deg. F. When frozen it cannot be easily exploded in the ordinary caps used in blasting, but it is very sensitive to friction, cutting or breaking. The thawing of the frozen dynamite is, however, more dangerous than the handling of it while still frozen. When dynamite is being thawed it begins, as previously stated, to leak nitro-glycerin. This process is generally termed by foremen as "rotting."

Whenever possible to do so, dynamite should be stored in magazines that are heated to an even thawing temperature. If dynamite is exposed to continued high temperatures the nitro-

glycerin will also leak from it. On most construction work it is not economical to build a magazine for storage that is heated, so the dynamite becomes frozen and has to be thawed out.

There are a number of safe ways to thaw out dynamite, but many methods used are exceedingly dangerous, and every winter the public press reports numerous accidents and fatalities that occur from these wrong methods, says Earth and Rock. Adduced are a few "don'ts" that should be observed:

Don't thaw dynamite by an open fire, or by a boiler, or on a stove.

Don't use boiling water or steam to thaw dynamite. Any water so used should never be thrown from the bucket or barrel, but should be poured gently into a hole and covered with earth.

Don't stand sticks of dynamite on end to be thawed, nor should dynamite be stored so that the sticks stand on their ends. Any method of thawing that necessitates the standing of the sticks on end should not be used.

Don't break frozen sticks of dynamite in your hands, but cut them with a cutter made for the purpose.

Don't throw sticks of dynamite about, whether frozen or not, but handle them with the utmost care.

Don't use a penknife in placing your exploders, but buy the tool meant to be used for such work.

Don't use heated stones for thawing dynamite by placing the stones and dynamite in contact. However, heated stones can be used to heat a chamber or box in which dynamite can be thawed.

Don't use a pick or bar to open a case of dynamite, but open cases carefully. A wooden wedge and maul will answer for this purpose.

Don't store caps and fuses with dynamite, nor keep them in the same tool box.

Don't carry caps in your pocket. A number of accidents have occurred in this way.

Don't use an iron bar in tamping your explosives.

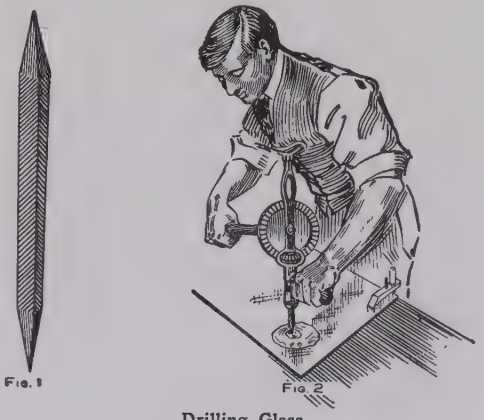
Don't thaw more dynamite than you need at one time, as every time frozen dynamite is thawed it becomes more dangerous.

Don't store dynamite that has once been thawed with your regular stock of dynamite, but put it in a separate place so that those using it will know it has been thawed.

Don't let your men decide on the methods they use in handling explosives or thawing them, but see that they use the proper method and understand the danger of the wrong ones.

Another Way to Drill Holes in Glass

Secure an old three-cornered file the size of the hole desired in the plate and grind two sides of it to a point as shown in Fig. 1. This file can be put in, held and turned the same as a bit in an ordinary carpenter's brace.



Drilling Glass

Lay the glass on a smooth surface with a small piece of cloth under the place where the hole is to be drilled. Take some soft putty and make a small ring around on the glass (Fig. 2) and fill the cup-like place with turpentine. Take the brace with the drill and begin boring the same as if boring in wood. Use a slight pressure on the brace and in a short time you will have a clean-cut hole. A hole can be drilled in this way through the heaviest plate glass made.—Contributed by E. L. Kayser, Des Moines, Iowa.

Testing the Quartering of Locomotive Drive-Wheels

A handy method is here shown of testing locomotive drive-wheels to determine if they are correctly quartered, after pressing them on the axle

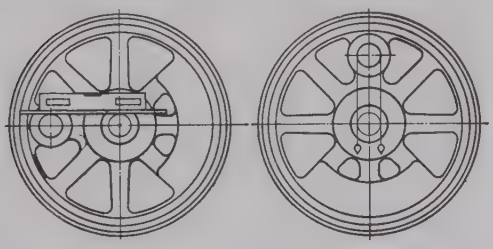


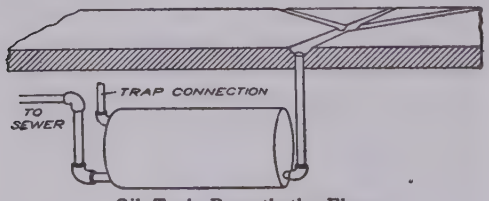
Fig. 1 Fig. 2

Quartering the Crankpins

First find the size of the crankpin close up to the wheel and draw a circle of the same size on the end of the axle. Clamp a straightedge on the wheel with one end resting on the crankpin and the other flush with the edge of the circle on axle, as shown in Fig. 1. Put a level on the straightedge and roll the wheels until level, then chock. Now go to the other wheel (Fig. 2) and repeat the process of measuring the crankpin and scribing a circle of the same size on the end of the axle. Drop a thread, with a small weight tied to each end, over the crankpin and if the thread touches the edge of the circle on each side the wheels are quartered correctly, if not, the thread will show how much they are out.—Contributed by R. T. Traylor, Suffolk, Va.

Saving Oil from Condenser Drips

A novel device illustrated herewith was designed and installed in a large

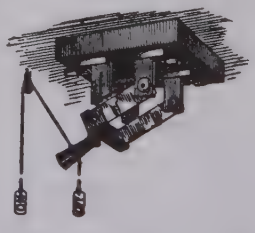


Oil Tank Beneath the Floor

power plant for use in saving oil from the drips, says Practical Engineer. The basement of the plant has a concrete floor with grooves by which the drip from the various pumps are led to a central drain. The drip flowing in these grooves carries a thin film of oil on the surface and to save this a separator made of an old tank has been utilized. This tank, which is 20 in. in diameter and has a capacity of 150 gal., is placed below the basement floor giving a head of about 3 ft. from the floor drain into the tank. The drainage is carried from a pocket in the floor to the bottom of the tank at one end and at the opposite end, connected to the bottom, is a pipe which goes up almost to the floor level. Passage of the water and oil through this tank is usually so slow that the oil separates out and rises to the top from which it is carried off by a trap. Four or five gallons of oil a day are saved by this device and put back into the engine oiling and cleaning system.

Hand-Operated Ceiling Switch

As I had no room for an electric switch near my workbench, I put it on the ceiling and operated the throw with two strings long enough to be within easy reach. A small pulley was fastened to the ceiling at the end of the switch block over which to run the string and give the two motions necessary to throw the switch lever both ways. A tag was attached to the end of each string and one marked "on" and the other "off." This arrangement can be placed anywhere on a wall and the strings run over pulleys guiding them to a point handy for the operator.—Contributed by Fred J. Seyerle, Pittsburg, Pa.

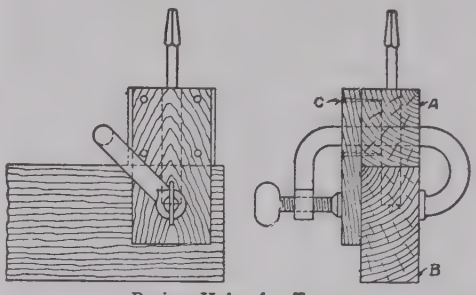


Asbestos pulp is used to a good advantage in the cracks of an old dried-out tank to hold the water long enough for the wood to swell.

A Tool for Making Mortises

In the construction of mission furniture where mortise joints are mostly used, those who cannot have access to a mortising machine will find the following method of great assistance in obtaining a true mortise, which is necessary in work of this kind.

Take a block of wood, A, the exact thickness of the piece B to be mortised, and with an auger bore a hole, the same size as the width of the mortise to be made, exactly parallel to the sides of the block. This can best be done on a drill press or a wood boring machine. If no machine is available, great care should be taken in boring by hand, to get the hole as nearly true as possible. Then nail a cleat, C, on the side of the block, A, and let it extend down on piece B. Use a clamp to hold the block in place while boring out the mortise. By changing the position of the block



Boring Holes for Tenons

and boring a number of holes, any length of mortise can be made. The holes should afterwards be squared up with a chisel.—Contributed by W. D. Whitacre, Canton, Ohio.

Fireplaces That Will Not Smoke

[Condensed from Suburban Life]

It is an easy matter to construct a fireplace that will not smoke, although there are thousands all over the country that are constantly giving trouble. To divert the greatest amount of heat into the room and still allow the smoke to escape up the chimney is not a difficult problem, if a few simple rules in regard to the construction of the chimney throat are followed and the proper proportion between the size of the flue and the size of the fireplace opening maintained. In trying to obtain this result with the greatest economy in fuel, complications sometimes arise with very annoying results.

First of all, the chimney should be built higher than the nearby roof ridges, and there should be no tree branches hanging over it to retard the draft. There should also be a separate flue for each fireplace, with no stove connections into fireplace flues. If the chimney is built on the outside of the house, having an outside wall exposed to the weather, there should be a double wall at the back having a 2-in. air space. This will prevent the outside brickwork from cracking when the fireplace is being used during cold weather.

The shape of the fireplace makes considerable difference in the amount of heat thrown out. Splayed (sloping) sides reflect more heat into a room than sides that are at right angles to the front and back. An iron lining to the fireplace will also reflect considerable heat, although it will last only a year or two without being renewed.

In Fig. 1 the best construction for a fireplace is shown; this section being taken at the center of the fireplace through the ash pit below and the center of the flue above. The back of the fireplace inclines forward, starting at a point a little over halfway up the back of the fireplace. The brick arch, either

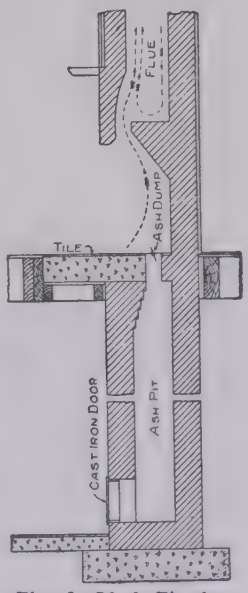


Fig. 1—Ideal Fireplace

flat or segmental, has a soffit, which is the width underneath, of about 4 in., giving little surface for the smoke to strike against and reflect into the room. The throat is long and narrow, and as shown in Fig. 2 by the dotted lines, contracts gradually to the center until it is of the same width as the flue at the center, and from there it may be carried to either side as required. In no case should the flue rise directly from one side of the fireplace, since this would cause it to smoke on the opposite side.

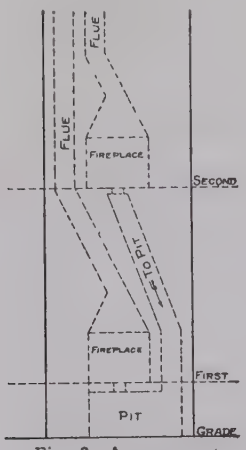


Fig. 2—Arrangement of Flues

The sectional area of the throat and of the flue also, should be one-tenth the area of the fireplace opening. For example, if the fireplace opening is 4 ft. wide and 2½ ft. high, the sectional area of the opening would be 10 sq. ft.; this, divided by ten, gives a flue 12 in. square and the throat at its opening would be 3 in. by 48 in., both throat and flue having a sectional area of 144 sq. in., or one-tenth of the fireplace opening.

An important consideration is the depth of the fireplace. The distance from the face of the fireplace to the fire brick back, when intended to burn wood should never be less than 18 in.; and 14 in. for a coal grate. These are the minimum depths and it is advisable in either case to make them 2 in deeper. The fireplace intended to burn cord-wood should be at least 4 ft. 6 in. wide. The dimensions of fireplace openings vary according to the design. They are usually from 30 to 48 in. wide, 18 in. deep and from 24 to 36 in. high. In large ballrooms, club rooms, cafés, hotel parlors, etc., they may greatly exceed these dimensions.

In order to avoid frequent repairs and also to lessen the danger of the floor timbers becoming ignited by fire dropping through cracks in the bricks, all fireplaces should be lined with firebrick, and a tile flue is much better than a cement plastered or a pointed up flue. Carry the tile about 2 in. above the chimney cap, so that the water will not wash off the top of the chimney into the flue.

Many fireplaces smoke, but the remedy in most cases is very simple. The common cause is the clogging up of the chimney, during the construction, with rubbish. Often a small piece of board will be dropped into it and, lodging at an angle in the chimney, prove a hindrance to the draft until a brick or stone is dropped down from above to loosen and dislodge it. Another common cause of smoking is the damper used in the throat. The sliding damper, which, when open still closes half of the throat with its metal parts should never be used. The damper when open should leave the entire throat free and unobstructed. There are several dampers on the market that accomplish this easily, some of them being controlled from

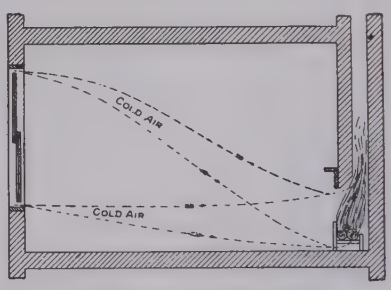


Fig. 3—Air Pushing into Supply Draft to a Fireplace

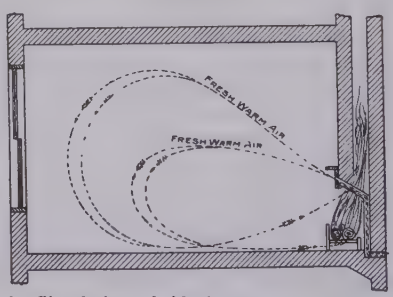


Fig. 4—Circulation of Air in Room When Fireplace Has Its Own Draft

the outside. There should always be a damper in the fireplace throat, since there are times when it is desirable to close up the passageway. In some parts of the country it has been observed that mosquitoes make their way down through the opening in the fireplace. When some kind of a damper is provided this is prevented. The best kind of damper is one that is constructed to regulate the draft according to the amount of fire needed and its condition.

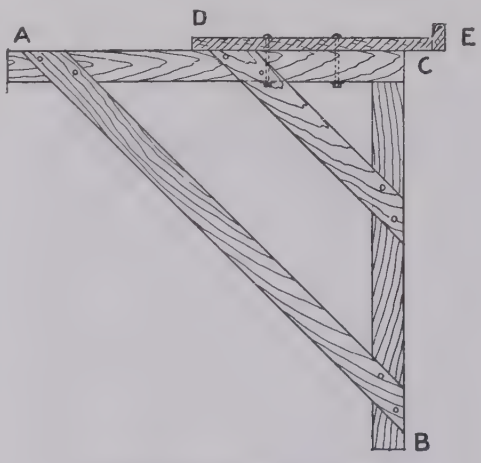
The hearth of the fireplace should extend 16 to 24 in. into the room, and it should be level with the floor. Unless this is specified, the mason probably will build it about ½ in. higher, which will necessitate a molding to break the joint. Then, when the hearth is flush with the floor, any debris made while building the fire (and there is always sure to be some) may easily be swept into the fire.

The best hearths are constructed from brick laid on edge, but satisfactory ones may be made with the bricks used flat side up, in which case only about half as many bricks will be needed. The "herring bone" pattern is one of the most popular constructions for hearths.

To provide for the draft of a fireplace is another important item in its construction, says a correspondent of the House Beautiful. Just as air cannot be sucked out of a bottle, so draft for a fireplace cannot be drawn out of a tight room. The careful construction of modern houses, with tight-fitting doors and windows, with sheathing paper and with back plastering, is responsible for many smoky fireplaces. It is not that the oxygen of the air is burned, but that the chimney cannot get the air current to carry off the smoke. The opening of a door or window, as shown in Fig. 3, in such a well made room will, of course, give the air supply for the fire. It is an extravagant and unsatisfactory way, however, to warm the outside air after it enters the room, to say nothing of the unpleasant cold drafts near the floor. Inventors for the past hundred years have endeavored to supply the air for the fireplace so that it would not cross the room in a cold stream. The most satisfactory way yet found is to have a cold air box bring a supply from outdoors. Pipes or tubes should carry the supply across the fireplace, and introduce the air warmed through a register at the top of the fireplace or over the mantel as shown in Fig. 4. This means an increase in the amount of heat realized, as well as making the air pressure right for the free burning of the fire.

A Carpenters' Scaffold Bracket

The accompanying sketch shows the construction of a carpenters' bracket to hold scaffolds. The main part of

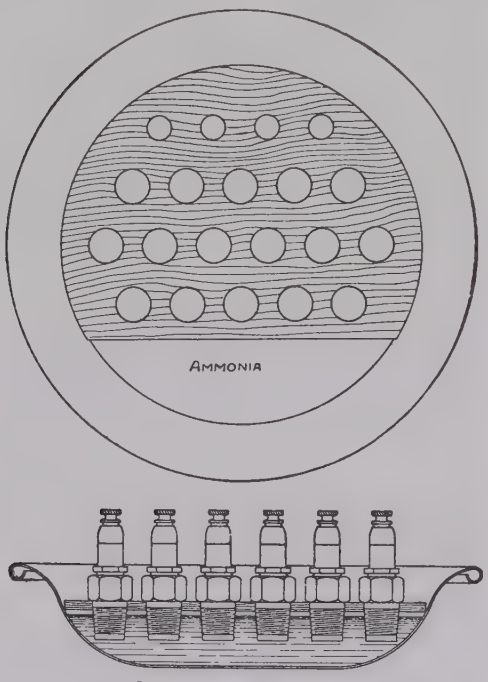


This Bracket Needs No Brace

this bracket is made up in the usual manner and to the piece A C is securely fastened an iron rod, projecting about 1 in. beyond the end of C and then turning upward for a little over 1 in. A 1¼-in. hole is bored in the sheathing at the right place and the end of the rod inserted in the hole; let the bracket fall in place and secure with a nail driven through CB into the sheathing. An iron crosspiece may be fastened on the end of C to make it more rigid.—Contributed by D. F. Showalter, Davenport, Neb.

How to Clean Spark Plugs

The accompanying sketches show a very simple yet efficient method of cleaning spark plugs and will be found



Plugs in the Ammonia

very useful around an automobile garage.

Take an ordinary porcelain wash-basin and cut a thin board to fit it as shown in the bottom sketch. Bore holes in the board to suit the size of the spark plugs to be cleaned. Place the board in the pan, then put the plugs in the holes, sparking end down. Now pour concentrated ammonia into the pan until it almost touches the board. Let it stand from 15 minutes to one hour then brush the plugs with a stiff tooth-brush dipped into the ammonia, and the carbon can be easily cleaned from them. If the plugs are rinsed in hot water after cleaning they will dry much quicker.—Contributed by Claude M. Sessions, Waynesville, Illinois.

Venetian red darkened with lamp-black makes a good imitation rosewood stain.

Some Vise Attachments

When suitably equipped, the usefulness of a vise is greatly increased and a variety of operations can be quickly and easily done. The following list of accessories are worthy of consideration:

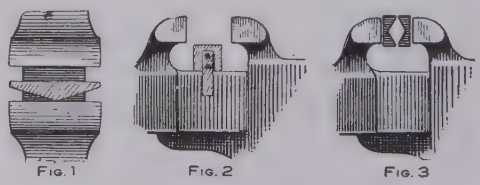
1—A pair of copper or brass jaws. These are used to grip irregular shaped pieces that are held by the vise jaws, say, in only one spot; the softer metal yields and fills out the low places. Brass jaws are good to grip finished work that must not be marred or pinched on the edges by the regular jaws.

2—A pair of fiber jaws, to hold brass work and very particular finished iron and steel pieces. Brass jaws will bruise the latter, unless used with utmost care.

3—A pair of round-cornered jaws. Use these for making bends in flat stock that does not need to be sharp. Have one jaw rounded to 1/16-in. circle and the other to ⅛ in. The ends may also be rounded.

4—One swivel piece. Very often it is desired to hold some taper work and unless it is put in a swivel-jawed vise, the piece is very hard to hold. This swivel piece is simply a three-sided chunk of steel, as shown in Fig. 1. The piece is self-adjusting for any angle.

5—A lazy man or rest piece. This is a block of wood or metal having clips screwed on the ends to keep it in place, Fig. 2. This is used to lay work on when it is too small to rest on the bottom slide. It can be made adjustable, or added to, or a set kept on hand of



Attachments as Used

various heights. Anyone who has tried this knows how aggravating it is to hold an 80-lb. piece between the jaws of a vise and on a level with them,

meanwhile trying to tighten the vise with the knees; then perhaps have the work slip to the slide just as you have the screw about tight enough. With these blocks, the piece may be set to the proper height and the screw tightened with one hand.

6—A pair of V groove jaws. Use these to hold round stock. It is best to have at least one end rounding so the stock can be bent if necessary. These jaws are shown in Fig. 3.—Contributed by Donald A. Hampson, Middletown, New York.

A Lumberman's Shield

Yardmen and carpenters, or men carrying boards and boxes on their shoulders, find it necessary to use pad-

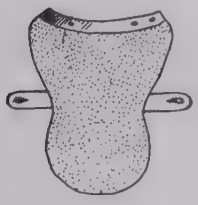


Fig. 1

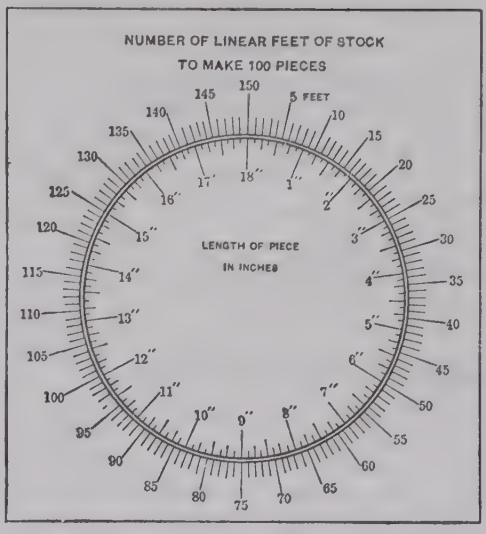
Fig. 2

The Leather Protects the Cloth

ding or some old worn-out coat to protect the wear on the clothing as well as the flesh on the neck. A light shield can be made for this purpose, as shown in the sketch, from a piece of leather. The part to cover the shoulder is shaped as shown in Fig. 1 with two flaps attached with buttonholes. The other piece to protect the neck is attached to the first piece and the whole fastened to the shirt or coat with buttons.—Contributed by L. F. Canavan, Albany, N. Y.

Chart for Stock Purchasing Department

A handy chart for use in ordering stock or checking up to see if enough material is on hand, is described by a correspondent of Machinery. The inner circle of figures, shown in the accompanying illustration, represents the length in inches of the piece re-



For Checking Up Stock

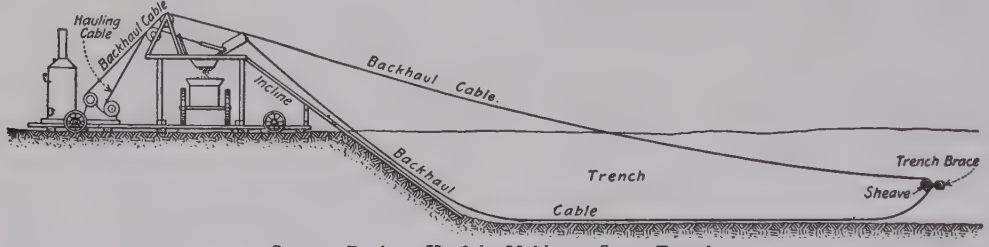
quired; while the figures on the outside give the number of linear feet of stock necessary to make 100 pieces. For example, if the length of a piece as per order is 2⅞ in., and there is an allowance for cutting ⅛ in. off, the total length would be 3 in. Referring to the chart the figure 3, in the inner circle, is opposite the figure 25 in the outer circle, which is the required number of feet in making 100 pieces; having this, the amount of stock for any number of pieces can easily be determined.

Water Main Leaks Located by a Telephone

A leak that was causing a great deal of trouble for a water company could not be located by ordinary means and the employes finally used a telephone to find the break, says Telephony. The instrument was attached in a circuit containing a battery to hydrants or other points of contact with the water main, and as soon as they were within 1,000 ft. of the break, they were able to detect it by the increased sound of the rushing water. The persons that found the leak by this method are very enthusiastic over the device which enabled them to locate the trouble when other means failed.

Trenches Made with a Scraper Excavator

The use of power-operated scrapers or scraper buckets in the excavation of trenches for sewer or other work is one of the latest applications of the scraper bucket type of excavator, says Engineering News.



Scraper Buckets Used in Making a Long Trench

With the system described below, the trenching is done in lengths of about 75 ft. to 100 ft. At the forward end of the length is stationed a portable tipple or dumping frame, the platform of which is at such a height above the street as to allow wagons to be driven under it. One end of the tipple carries an adjustable incline extending down the head of the trench. The other end has an A-frame with two cable sheaves. In front of the tipple is a double-drum hoisting engine. The bucket has a pivoted bail. It is 3 ft. wide, of about 25 cu. ft. capacity, and weighs 400 lb.

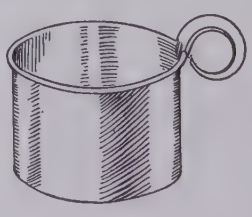
A ¾-in. hauling cable is attached to the bail of the scraper bucket, and is led over a sheave on the A-frame to one of the drums of the engine. The second drum carries a ½-in. back-haul cable which is led over the upper sheave on the A-frame and back to the rear end of the section being excavated; there it passes through a sheave or snatchblock hitched to a cross brace at about mid-height of the trench and returns to the back end of the bucket, to which its end is attached. This cable is used to pull the empty scraper back into position for a fresh cut. This is done without interference with the trench bracing, the cable being led over or under the cross braces as occasion may require. The general arrangement of the plant is shown in the accompanying cut.

When the bucket is at the back end of the section and ready to start, a signal is given from the trench to a man on the tipple platform, who signals the engineman. As the bucket is started by the hauling cable, two men hold its nose or cutting edge to the ground to ensure its making a cut and taking a proper load. When full, the weight is at the back of the bucket. The bucket is hauled along the bottom of the trench and up the incline to the tipple, where it strikes a trip block and is tilted up (as the hauling continues) so as to dump its contents through a chute into a car or wagon standing beneath.

Where the ground is hard, a plow is used; this is attached to the same cables and takes the place of the bucket. The plow cuts about 18 in. deep. It is of special form, with no handles, as the handles of an ordinary plow would be liable to catch in the bracing when the plow is being hauled back ready for a new cut. Its weight is from 400 to 700 lb., according to size.

Campers' Cups

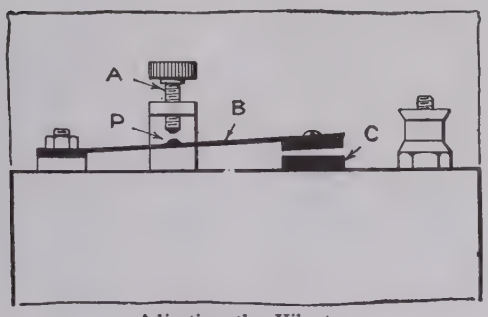
Some campers lost their tin cups and as they were several miles from the nearest tin shop they decided to make a few substitute cups from the tomato cans they emptied. The entire cover was removed from each can and the tin was cut with a pair of shears ⅜ in. on each side of the seam down to a depth that would make the right height for the cup. The metal



was then cut around the can, except the seam, which, when bent, made a good handle. One-eighth inch of the edge was rolled over so it would not cut the lips.—Contributed by Geo. Hogan, Providence, R. I.

Adjusting a Spark Coil

The trembler on a spark coil may be adjusted by first removing the spark plug, and, if the points are about 1/32 in. apart, removing the vibrator contact screw, A, as shown in the sketch; then adjusting the vibrator spring, B, so that the hammer or piece of iron on the end of the vibrator spring stands normally about 1/16 in. from the core of the coil C; now screw in the con-



Adjusting the Vibrator

tact screw A until it just touches the platinum contact P on the vibrator spring. Start up the engine and if it misses fire at all, tighten up or screw in the contact screw a trifle at a time until the engine runs without missing explosions. If the carburetor is properly adjusted and the coil and wiring in good condition, it should now give a quick action and ample spark with the smallest possible consumption of battery energy.

How to Fasten Mallet Handles

The old method of fastening mallets to handles by boring a hole through the head and inserting a wedge from the outside may be superseded by a new way that makes the tool much neater and one that conceals the wedge and eliminates all possibility of the head flying off as the wedge cannot come out. This new way is to bore a hole the size of the handle and three-

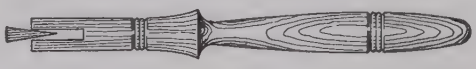


Fig. 1

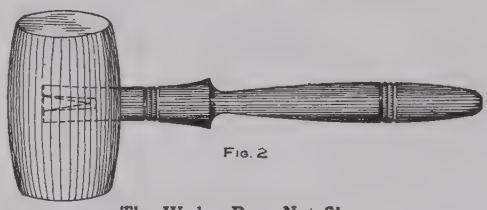


Fig. 2

The Wedge Does Not Show

fourths the distance through the head, then cut a slot in the handle and insert a wedge as shown in Fig. 1. Put the wedge end into the hole bored in the head and drive it in. When the wedge touches the bottom of the hole (Fig. 2) it will be driven into the split of the handle thus forcing the sides out and making a tight fit.—Contributed by Louis P. Lukert, Philadelphia, Pa.

A Home-Made Alligator Wrench

The accompanying sketch shows a light alligator wrench which can be made by any blacksmith.

Secure a piece of steel of suitable length and cut a number of teeth in it with a triangular file as shown in Fig. 1. Then bend it as shown in Fig. 2. To bend, first heat the piece red-hot and cool the ends in water, except where the bend takes place. After bending, redress the teeth, if necessary, and temper in oil until a smooth file

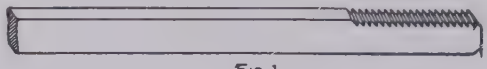


Fig 1

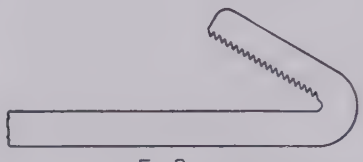


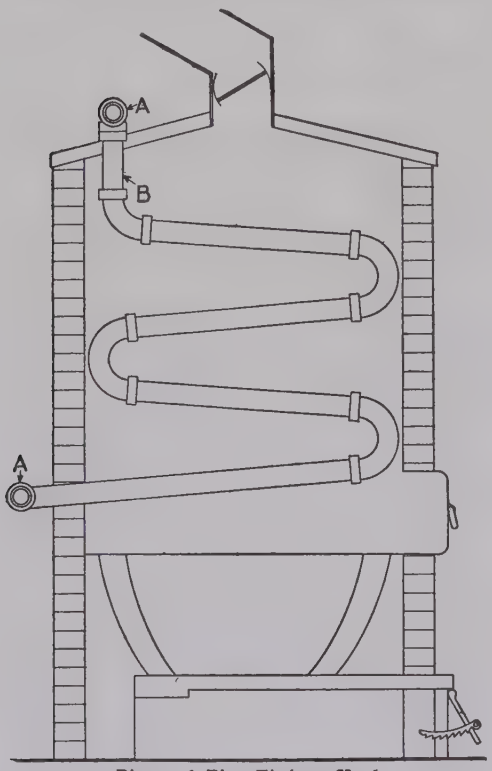
Fig. 2

One-Piece Pipe Wrench

will just cut the metal. The wrench will be found very useful for light work. —Contributed by J. H. Byers, Little Rock, Ark.

Home-Made Hot Water Heater

As we desired to put in a hot water heating system in our house and as the estimates seemed too high for us, we



Pipe and Pipe Fittings Used

decided to put in the system and to make our own heater, which, when completed, proved very satisfactory and was much cheaper to install. A firebox, grates, ashpan and door from an old hot air heater were used. Then a pipe boiler was constructed from two manifolds, A, which we purchased, each having four outlets for 1-in. pipe openings and in both ends for 1½-in. pipe. Twelve 1-in. return bends, four 1-in. ells and four 1-in. nipples, 6 in. long, were purchased. The center lengths of pipe were cut so as to bring the return bends inside the casing and the manifolds outside.

The pipe had to be bent a little so as to give it a drop and not allow the water to trap. The burr was reamed out of the pipe ends to allow free circulation. There were four sections made this way, one for each opening in the manifolds. The casing was built of brick covered with cement after all the piping and firebox fixtures were in place. The top is one piece of cast iron, made from a pattern of our own construction.

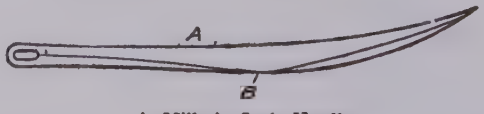
Connections were made to the system from the ends of the manifolds which were 1½-in. pipe. The hot water was taken from the top manifold and the return connected to the bottom. This boiler has been in use for some time and has given entire satisfaction.—Contributed by H. O. Hingley, Smithville, N. J.

Injury to Tires Ridden Soft or Deflated

The pneumatic tire is the best for runabouts and touring cars because of its resiliency, ease of operation and its quick and simple method of repair. Pneumatic tires are susceptible to punctures and other injuries which, if not given the proper attention, result in a soft or deflated tire. The user, quite often through an ignorance of the technical construction, or probably from an indifference to the result, will ride the tire a considerable distance deflated, which will injure a tire so it will require quite an expenditure for repairs, or render it unfit for further service. Although it is not always convenient to make repairs or replacements with an emergency tire carried for that purpose, it is beyond doubt advisable, in view of the injuries that will probably otherwise occur.

Sack Needle and Twine Cutter

This little tool, as illustrated, was devised by a correspondent of the American Miller and has proven to be a



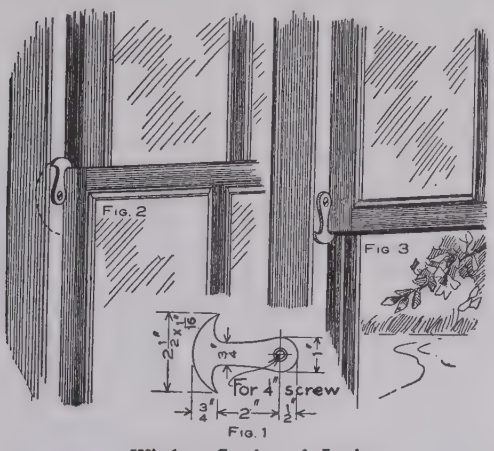
A Miller's Sack Needle

great time saver. Simply sharpen one side of the needle near the point. This cuts the twine.

Factory Window Stops

A factory properly constructed requires a great number of windows and to fit them with weights and locks would make quite an expense. Plenty of air can be admitted by having the upper sash stationary and the lower sash movable.

The illustration shows how the movable lower sash can be locked at night and held open in the day time without the use of weights or expensive hardware. A small piece of 1/16-in. iron or heavy galvanized iron can be used in forming the lock, as shown by the small detail, Fig. 1. The metal should be pivoted to the window frame far enough below the meeting rail of the



Window Catch and Lock

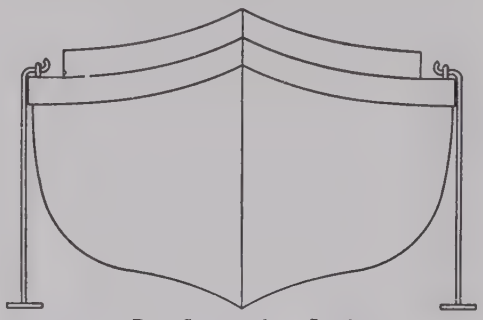
sash so that when the lower sash is down, the edge of the lock will clamp on the top of the sash, as shown in Fig. 2.

When the window is raised the lock can be swung around so it will catch underneath the window which holds it open (Fig. 3), taking the place of weights.—Contributed by E. R. Armstrong, Springfield, Ill.

Supports for a Small Boat

The accompanying sketch shows a very simple contrivance for keeping a small boat or launch upright when aground or in very shallow water.

Secure two iron rods of suitable size, a little longer than your boat is high. Bend one end of each to fit the gun-

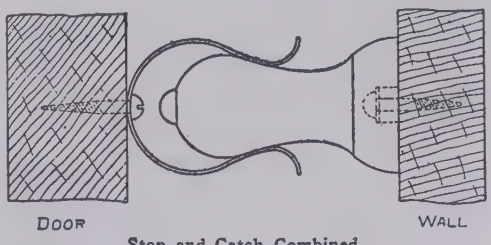


Boat Supported on Land

wale of your boat as shown in the sketch. Tap the other end into a plate or cast-iron block of the proper size. Screw two large screw eyes into the gunwale of the boat, one on each side, and by hooking the rods into them your boat will remain upright on almost any kind of a bottom.—Contributed by Newton Thomas, Jr., Seattle, Wash.

Door Retainer

A simple and inexpensive door retainer can be made out of an old clock spring, or a scrap piece of steel, by anyone in a few minutes' time. Secure a piece of material about 6½ in. long and 1½ in. wide; drill a hole in the center for a screw and bend it as shown in the accompanying sketch. Fasten it securely to the door with a screw so that it will catch an ordinary wooden door stop at the wall when pushed against it. A slight pull will unfasten

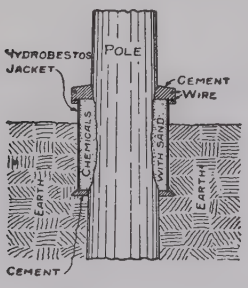


Stop and Catch Combined

the catch, yet a strong draft will have no effect on it.—Contributed by K. Kuga, Hoquiam, Wash.

A New Method of Preserving Wooden Poles

A new method of preserving wooden poles and posts from decay at the ground line was described in a paper by H. P. Folsom read before the Association of Railway Telegraph Superintendents in Detroit. The main feature of this method is in surrounding the base of the pole with a fiber cylinder which encloses a mixture of powerful germicides packed around the pole above and below the ground line.



In applying to poles which have begun to decay, a hole is dug around the pole to a depth of 14 in. below the ground line. All decayed wood is removed from the surface of the pole, and the bottom of the hole is then covered with a thin layer of Portland cement mixed with sand. A cylindrical jacket of "hydrobestos," a mixture of asbestos and asphaltum, about 4 in. larger in diameter than the butt of the pole, is then put in place in the hole with the lower edge embedded in the cement. The two edges of the jacket are lapped over about 2 in. and fastened with a specially prepared cement. The intervening space is then filled with a powerful germicide mixture packed in dry. The mixture ordinarily used consists of the following: 2 parts chloride sodium (rock), 1½ parts hydrated lime, and 3 parts sand, all thoroughly mixed together. After this is packed about the pole, a small amount of powdered sulphate of copper is poured in on top. A reinforced cap or collar made of Portland cement and sand is now formed around the pole on top of the jacket. For the reinforcement, one or more turns of an old telegraph or telephone wire are used. The reinforced cap protects the chemicals and the jacket from the action of rain and snow, and also protects the pole against damage from grass fires. The chemicals are slowly dissolved by the natural moisture in the pole, and they pass into the cell structure of the wood by capillary attraction. This continuous absorption destroys all fungi which may be in the pole at the time the preservative is applied, and the jacket and cap prevent the lodging of other germs in the wood near the ground line. The cement cap gives a finished appearance to the pole and experience has proved that there is little or no tendency for the concrete to crack or disintegrate, as there is no expansion or contraction in the pole which it surrounds.

Figuring the Chord of an Angle

Many of our best and most practical machinists are at a loss sometimes, for the want of a little technical knowledge, to know how to do certain things the easiest and shortest way. Especially is this so in jig and die work where great accuracy is required.

An example came to our notice a short time ago where a machinist had five bosses to lay out to be drilled for bushings. By referring to the diagram, it can be seen how they were located. They varied in height by ½ in., else it would have been an easy matter to lay them out with a protractor. The machinist located the first three that were in a straight line very easily. He then did a little figuring and found the chord distance to the other bosses. Finding the length of the chord is a very easy matter, for most mechanics carry a small hand-book of some

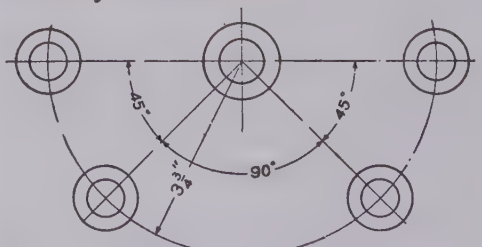


Diagram of Angles

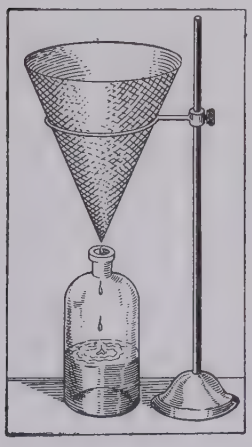
sort that contains a table giving the sines of the angles. In this instance we have a 45-deg. angle, the sides of which are the same as the radius of the circle (3¾ in.) on which the bosses are

located. To find the length of the chord, take one-half the angle, which gives us 22 deg. and 30 min. Looking up the sine of 22 deg. and 30 min. in the table, we find it to be .3827. Multiply this by the diameter of the circle (7½ in.) and we have the length of the chord, which is 2.87 in., or the distance from one boss to the other. The machinist used ½-in. buttons on the bosses that were low and lined them up with an indicator before boring. When the job was finished it was found to be correct.

Any other angle could have been figured in the same manner. Die and templet makers quite often have use for this information as they frequently have to check over the draftsman's figures and a slight mistake means a loss of time and money.—Contributed by J. V. D.

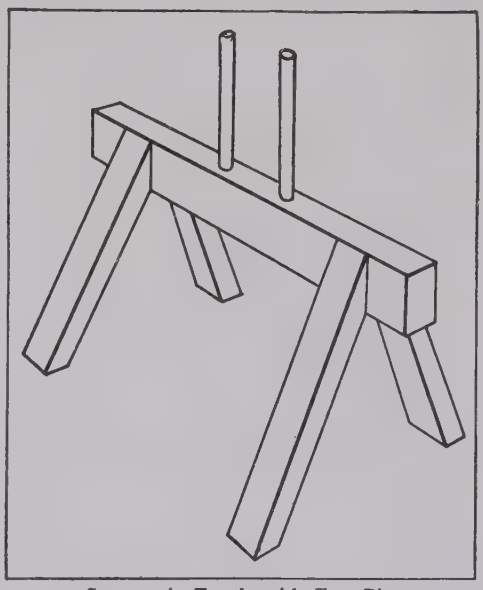
Wire Screen Funnel for Holding Filter Paper

If filter paper is placed in an ordinary funnel, no solution will go through the paper, except at the point end. Corrugated glass funnels are made to assist the solution after passing through the paper in flowing toward the opening in the stem of the funnel. Herewith is illustrated a funnel made from ¼-in. mesh nickel plated wire screen formed into a cone. The filter paper is placed inside of the wire screen cone in such a position as to adhere to the sides when the liquid is poured in and when filtered through the paper the solution will follow the wires until it drops from the pointed end into the container. This funnel gives free access for the liquid to seep through the filter paper anywhere.



A Sack Turner

The illustration shows a very simple home-made sack turner that is very useful about the flour mill. The turner



Carpenter's Trestle with Two Pins

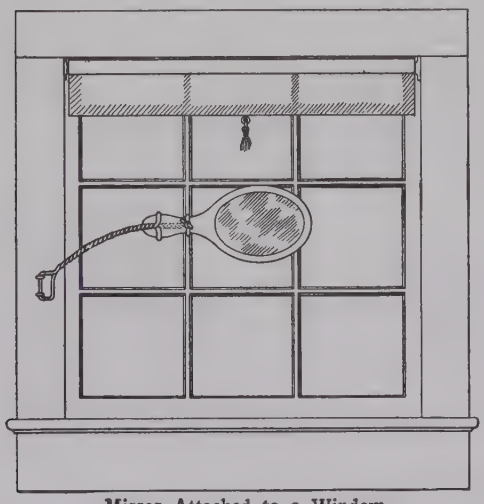
consists of an ordinary carpenter's trestle with two holes bored into it the right size to hold a broom handle and wide enough apart to accommodate the width of the sack it is desired to turn.

Take the top of the sack between the thumb and finger of each hand and place at top of the broom handles. Turn the outer edge over the ends of the handles and pull down. The sack is now wrong side out. Lift it off the handles, shake the dust off and then pull it down over the broom handles as before and the sack is turned back, right side out, all clean and ready for use, says the American Miller. It is possible to turn any size of sack in this way by having the handles the right distance apart to suit the width of sack.

Felt from an old hat makes good packing for automobile water circulating pumps. Strips should be cut to fit snugly in the stuffing box. When the follower is screwed down, it will expand the felt and make a watertight joint.

An Adjustable Window Shaving Mirror

A common hand mirror may be easily converted into an adjustable window shaving glass by twisting a



Mirror Attached to a Window

piece of ⅛-in. wire that is 3 ft. long into the shape shown in the sketch. If only one position of the mirror is desired, the wire may be bent in a square with the ends twisted for 12 in. of the length and fastened with two staples as shown. Where it is to be adjustable, a 2-in. ring is made in the center and the extending ends of the wire twisted together. One staple is put over the wire in the ring and driven into the window casing. The wire can be adjusted to any position by slipping the ring part through the staple. The wire at the twisted ends can be easily fastened to the wood handle of the mirror.—Contributed by A. Pujols, Ft. Screven, Ga.

A Simple Nail Puller

A harpoon or nail puller for hooking out nails in repairing slate or shingle

roofs is shown in the accompanying sketch. The one I made was cut from an old cross-cut saw blade, but any other good steel will answer the purpose as well. The hooks should be filed sharp. A piece of wood can be riveted to each side of one end for a handle. It will be found a very handy tool for those who do much roof repairing.—Contributed by John A. Wolfgang, McAlisterville, Pa.

Laying Out Keyways on Locomotive Drive-Wheel Axles

A quick and accurate method of laying out keyways on locomotive drive-wheel axles is here shown.

Clamp the axle on the bed of the machine on which the keyways are to be cut, then with a square draw a perpendicular line through the center of one end of the axle (Fig. 1), and with a surface gauge draw a horizontal line through the center of the opposite end (Fig. 2). With a box square extend these lines along the sides of the axle where the keyways are to be cut. Make a small mark with a center punch on each of these lines and with each of these marks as a center draw circles with a divider, the diameter of the circles being equal to the width of the

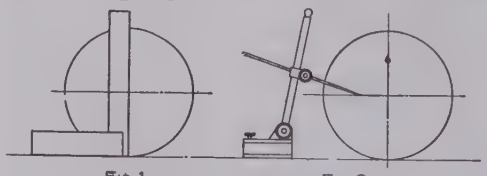


FIG. 1 FIG. 2

Quartering the Shaft

keyways to be cut. Cut the keyways to the sides of the circles and the axle will be correctly quartered.—Contributed by R. T. Traylor, Suffolk, Va.

Bronze bearings may be cleaned with a solution of washing powder and water run through the oil cups while the machine is running without any load. The solution, cutting out the dirt and grime, will come from the bearing very black. About 1 pt. of this mixture should be run through each bearing, then clean thoroughly with clear water. This makes a bearing and axle smooth and clean.

SHOP NOTES

How to Make a Concrete Garden Vase

Few people realize that anything of an artistic nature can be made from cement. Concrete is generally looked upon as a material fit for only heavy work and so little seems to be known that it has unlimited possibilities of artistic treatment.

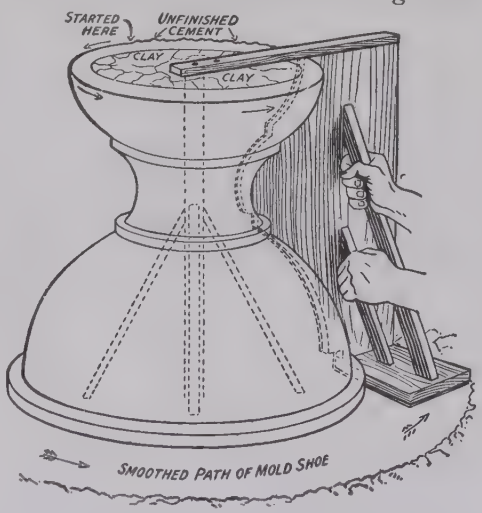
The concrete garden vase as illustrated shows how easily ornamental designs of this nature may be worked out, and such a completed article will cost very little for the materials. A vase of this kind can be made with a half form cut from sheet metal and fastened to a wood base to which is attached an arm for the radius to describe a circle, and a sliding shoe securely nailed to the bottom.

The first thing to do is to lay out one-half of the design intended for the vase on cardboard, then cut out to the line for your pattern. Lay this pattern on a piece of sheet metal, about 28 gauge, and mark out the design and cut the metal on the mark with tinner's shears. Mark out the same design on a wide board that is 1 or 1¼ in. thick and cut out the wood with a keyhole saw. Lay the metal on the board, allowing the form side to project over the edge of the wood about ¼ in., and tack all around with 1-in. brads. Bevel off the wood with a wood rasp for clearance, so the sharp edge will be free to cut the cement clean.

Mount the board with the metal face on a bottom board placed at right angles, which is used for a shoe. This shoe should be shod with a piece of sheet metal so it will slide around easily. Two braces are attached to the back of the board and on the top of the shoe.

The arm must be securely fastened to the top edge of the board, and have sufficient length to reach over to the center of the intended size of the vase.

A standard for the center of the vase shown by the dotted lines in the sketch is well braced and staked to the ground



Forming the Concrete Vase

where the finished vase is to remain. Clay is made plastic by adding water and then it is built up around the stake in a form near the shape of the finished vase. The arm of the former is now fastened to the top of the center stake with a large wood screw. The hole through the arm should fit the body of the screw a little loosely so the form can be turned easily. Take hold of the braces as shown and push the former around in a circle and cut off the surplus clay. There may be some holes left from the first cutting, which can be filled up and the former run around for a finishing cut. When this is complete, remove the screw and set the former out for a distance equal to the desired thickness of the concrete.

Mix your concrete, making it rather thick and plastic, using two parts sand and one part cement, and put a coat of this on over the clay form. Take hold of the braces as before and form the

concrete the same as you did for the clay, remove the former and give the outside surface two or three thin washes of neat cement. When the cement has set, the clay can be removed and soil put in its place.

In forming vases, bases, columns, etc., always have the largest or heaviest part down. This will make it easy to remove the clay core without the danger of cracking the concrete.—Contributed by W. A. Lane, El Paso, Tex.

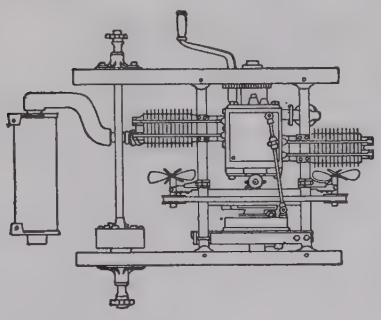


FIG. 1
The Engine

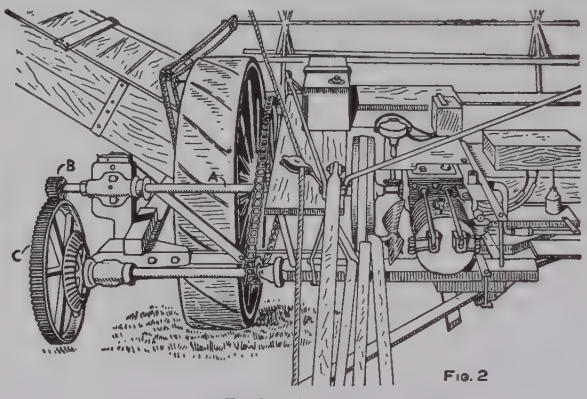


FIG. 2
Engine Attached to Binder

Home-Made Motor-Driven Harvester

The owners of a Colorado ranch desired to change the motive power of their 14-ft. cut header and binder and a 16-year-old boy successfully attached a 14-hp. air-cooled four-cycle gas engine to take the place of the horses. The engine was taken from a farm auto buggy and the cost of the change, outside of labor, did not exceed $7.

The engine, as illustrated by the line drawing, Fig. 1, was attached on the pushpole behind the header or binder and in front of the driver, as shown in Fig. 2. The transmission gear was removed and the countershaft, A, placed in its stead, and the speed reduced and transmitted to the machine by the small pinion B and gear C. The large chain from this shaft revolves the drive wheel of the harvester.

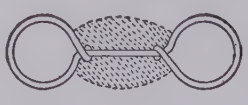
The operation was entirely successful and satisfactory and 35 to 40 acres of grain was cut each day with a fuel consumption of 8 or 10 gal. of gasoline. The machine would travel at a greater speed than horses could walk. The harvester proved to be only half a load for the engine.—Contributed by R. B. White, Denver, Colo.

How to Obtain Cheap Dry Batteries

Not very many people realize that good serviceable dry cells can be obtained from an automobile garage very cheap. These cells having been "run out" beyond the required number of amperes for automobile use, will give excellent service, considering their cost. Many of them will give two-thirds of their original amperage. Six of such cells have been in use on my door-bell circuit for nearly a year.—Contributed by H. H. Cutter.

A Wire Chalkline Holder

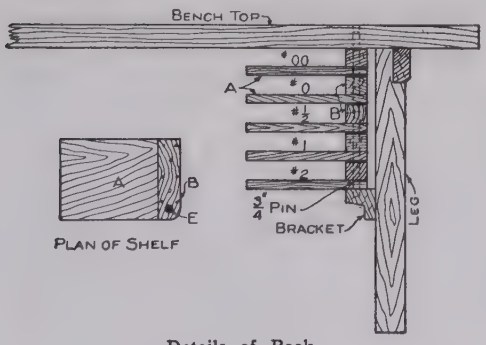
Anyone using a chalkline will appreciate the value of this simple line holder. It can be made of No. 9 or 10 gauge copper or soft steel wire in any length to suit the length of line. The line can be fastened at



any part of the metal between the two rings or at either end, and after the line is wound up the loose end can be fastened to prevent it from unwinding in the tool bag or kit. The accompanying sketch shows how the wire is bent and where the line is wound upon it.—Contributed by Geo. M. Mock, Buffalo, N. Y.

A Sandpaper Rack

Most every woodworker who works at a bench has several different grades of sandpaper that he is constantly using for different things, and unless he has a special place to keep them, the sheets will get badly mixed and mussed up. For workmen who have not already provided themselves with a suitable place to keep their paper, the little device shown in the accompanying sketch will prove interesting. It can be made by any workman in a very short time and it will soon pay for itself, by the time and labor it saves when one wishes a piece of paper. It is placed under the bench and is out of the way when not in use.

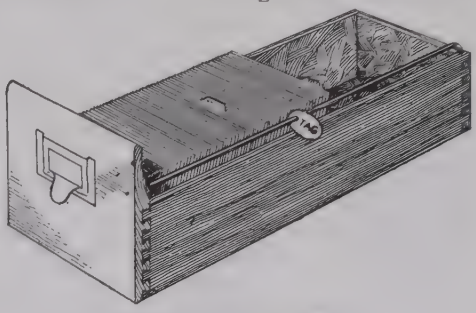


Details of Rack

The boards A are the length of the sandpaper plus 2½ in., and ½ in. wider than the paper. The batten pieces are 2 by 2½ in. and are attached to the board as shown at B. E is a ¾-in. hole through which a ¾-in. pin passes. Any number of boards can be used and the design can be varied to suit the bench and the one making it. The sandpaper is tacked to the board near block B and when a piece is wanted, the proper board is swung out and the paper is torn off.—M. E. D.

Marker for a Card Index

The place for a card taken from an index tray is not quickly found and for this reason the marker was made as shown in the illustration. This marking device can be put on any index tray by drilling two holes in the tray, one in the front board and one in the rear end of the side piece. Put a small aluminum or tin tag on a wire and



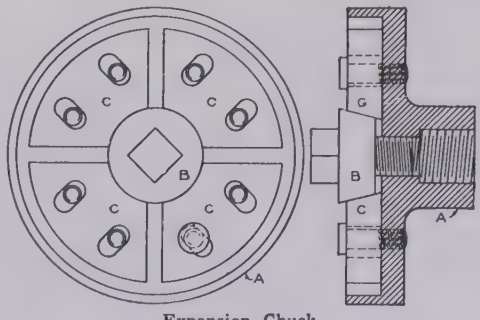
The Tag Marks the Place

place the wire in the holes as shown. When a card is taken from the tray, drop the tag in its place. The card then can be quickly replaced.—Contributed by Charles F. Weil, Chicago, Illinois.

Expansion Chuck

The accompanying sketch shows a design of an expansion chuck which will be found a very useful tool for holding piston rings and similar work while they are being faced off in the lathe.

The chuck proper, A, is made of cast iron. It is tapped out to screw on the lathe spindle. B is a screw with a taper shank which acts as a wedge to force the jaws C into contact with the ring. The jaws are held in place by tap bolts which are tapped into the piece A. They have slotted holes in

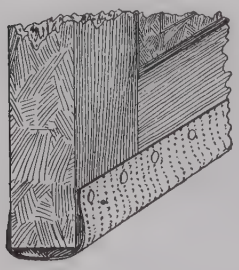


Expansion Chuck

them as shown in sketch so as to be adjustable.—Contributed by Wm. F. Arzinger, Jersey City, N. J.

Weather Strip for Inside Doors

A door swinging high enough to be free from rubbing a carpet or rug, will admit considerable cold air at the bottom. A weather strip that will wear for one season can be made from a newspaper or heavy wrapping paper placed over the lower end of the door and tacked on both sides as shown in the sketch. The paper will pass over uneven surfaces, edges of rugs, etc., without catching.—Contributed by W. A. Humphrey, Columbus, O.



Dressing Stone-Cutters' Tools

A practical way to dress stone-cutters' tools is as follows: For tooth chisels first forge out to the required thickness, which is determined by the hardness of the stone to be cut. It must be borne in mind that a tool forged and tempered to cut sandstone would not do for granite or oölite limestone, so the smith must determine what style of tool is required, then forge to suit the class of work, says the American Blacksmith. For very hard granite a tooth chisel should be made rather heavy with teeth cut as shown in Fig. 1. The teeth for cutting sandstone are also left heavy, but not sharp, as shown in Fig. 2. For oölite limestone and soft marble the tool is about the usual shape, Fig. 3.

Several cutters are made as shown in Fig. 5 for cutting out the metal between the teeth. These should be forged with plenty of clearance, so they will not stick. Use heavy oil to cool the cutters when cutting a tooth. Have the oil near at hand and keep the supply cutters in it. Space the blank tool with a small three-cornered file, as this will serve as a guide when the metal is hot. If possible, forge a large number of tools at a time, as you can get along so much faster with each operation. The blanks spaced should look like the sketch Fig. 4. The cutting operation will force the edges out to the dotted lines.

Put several blanks in the fire and heat slowly and keep them just hot enough to keep you busy cutting. A hot blank is taken from the fire and placed in the vise and the teeth cut with a cutter, driving it with a light hammer. After all the teeth have been cut, dress up the tool on the emery wheel and then finish each tooth with a small knife file to the required shape.

Burning a Wire Cable in Two

When an iron or steel cable is cut, the ends will untwist and spread out unless the part is well wrapped with wire on each side of where the cut is

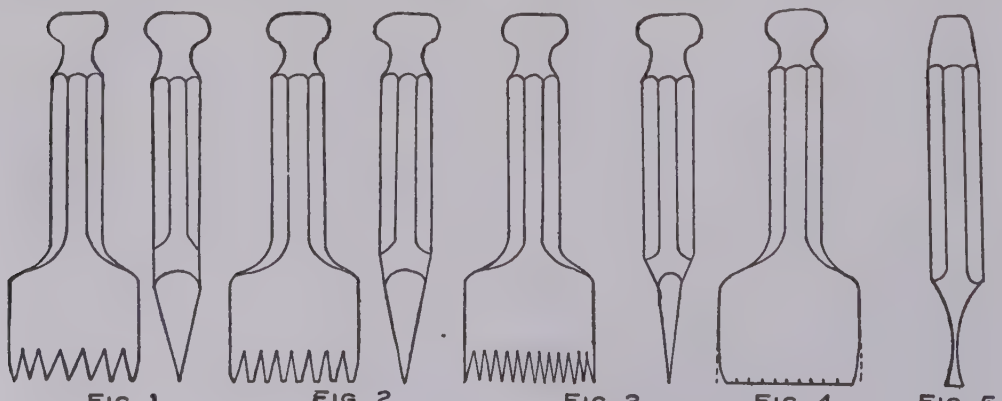


FIG. 1 FIG. 2 FIG. 3 FIG. 4 FIG. 5

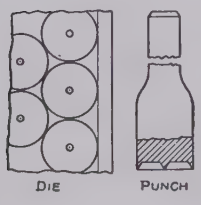
Designs of Stone Cutter's Tools

to be made. The quickest and best way to cut a cable, and one that will not require any wrapping with wire is to place it in the forge fire and burn the strands in two. Almost any size or kind of hoisting cable may be easily separated by this method.

First mark the place to be cut and hold the cable in your fire until there is a shower of sparks thrown off. Begin pulling on both parts of the cable at this time and when it is heated to a welding heat give the parts a good hard twist in the direction of the strands. This will pull the cable apart where it is heated, leaving the wires at each end all welded together and tapering down to a smooth point. Such an end does not need any wrapping to keep the wires that form the cable from coming apart.—Contributed by A. D. Wagner, Vancouver, Wash.

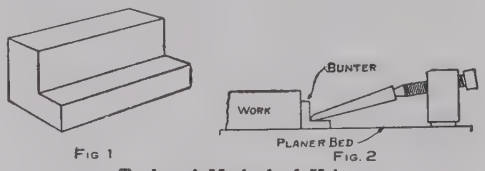
A Diemakers' Punch

In blocking out a die it is always necessary to lay out the holes very carefully so that there will remain but very little bridge between each hole after drilling. This is a very tedious job on a large die unless done by a punch as is here illustrated. The punch is made of tool steel, which is turned up on a lathe to the proper size and shape, then hardened. By placing the punch upon the die and giving it a sharp tap with a hammer you scribe a circle, as well as make the center mark. Mark off the required number of circles and enlarge the center marks with a center punch before drilling.—Contributed by Chas. E. Klink, Lemoyne, Pa.



A Tool for Holding Work on a Planer Bed

The accompanying sketch shows a handy little attachment for holding work on a planer bed and is called a bunter. Its object is to prevent denting finished sides of that class of work that must ordinarily be held by toe dogs or fingers. Two or more of these bunters can be used on a job and they



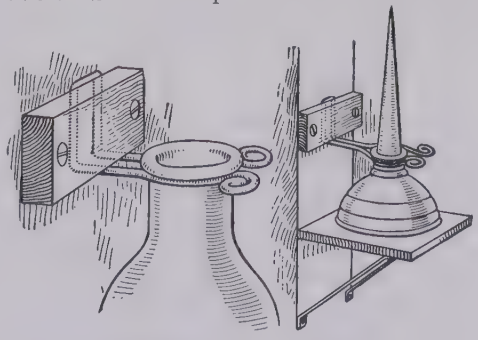
Tool and Method of Using

can be made with one low side, as in Fig. 1, or both sides alike, as in Fig. 2, or in any other form to suit individual cases; a single milling cut over a strip of steel being the only machine work necessary. When made of good steel and hardened they are practically indestructible.

They are very convenient to use in front of a dog that would come directly over a slot or post hole in the table as a bunter here interposed bridges the gap quickly and securely.—Contributed by Donald A. Hampson, Middletown, New York.

Clips for Holding Bottles and Oil Cans

A piece of ordinary wire, about No. 12 gauge, bent in the shape shown in the illustration and fastened to the wall with a couple of screws will make a handy clip for holding a bottle or an oil can. This device fastened in a tool box of an automobile, using the bottom in the place of a shelf will hold the oil can and prevent its being turned over. Such a clip is useful for tinners

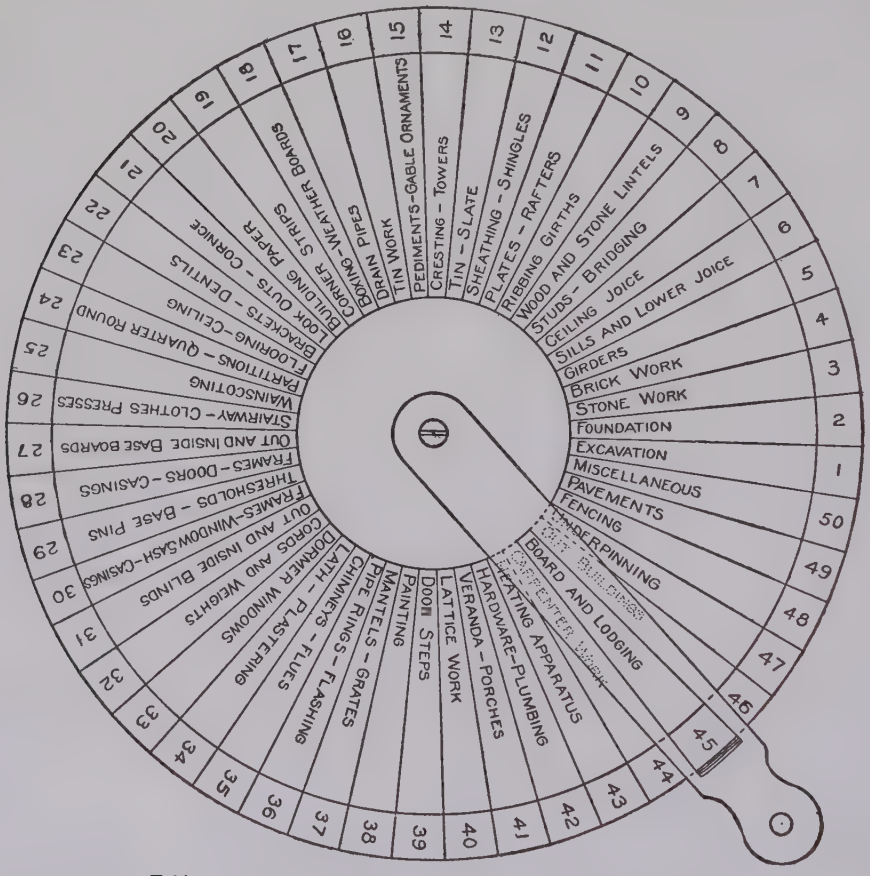


Bottle and Oil Can Holders

to hold the acid bottle in a handy place and keep it off the bench.—Contributed by Don C. Higbee, S. Omaha, Neb.

Handy Contractor's Estimating Wheel

In estimating the cost of materials for the construction of a building mistakes are liable to occur and many times certain things are entirely overlooked and not included in the total amount of your bid for completing the building as called for in the contract. I have used for many years what I call an "estimating wheel" to eliminate any errors of omission in making estimates on buildings of all kinds.



Taking the Numbers Successively No Part Will Be Missed

Commencing at number 1, "excavating," as shown in the illustration, and moving the handle successively on each number to the number 50, "miscellaneous," everything that is used in the building of an ordinary house has been called to mind.

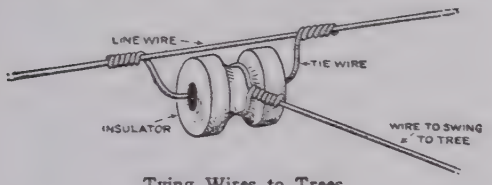
The wheel is made of a wooden disk, 8 in. in diameter and ¼ in. thick, on which is pasted the estimating index as shown in the sketch. The handle or indicator is made of galvanized iron cut out as shown and pivoted in the center of the wheel with a rivet or screw for the axle so it can be easily turned around to the various numbers, the part on which work is being done showing through the slot in the indicator.

On the reverse side of the wheel are pasted rules and formulas with illustrations showing the various cuts and bevels of rafters, rules for estimating brick in walls, chimneys, flues and pavements, for estimating stone work, number of nails to the pound and the amount to use in various kinds of

work; strength of timbers and many other useful notes on making estimates. —Contributed by T. T. Templin, Paris, Kentucky.

Single Telephone Wire Hung from a Tree

Should it be necessary to run a single telephone wire through woods and swamps, swing the line to trees with the hanger as shown in the sketch. This will save many poles from being placed where possibly it would be hard to keep them standing, especially in swamps, says Telephony. Be careful to so run the wire that branches and



Tying Wires to Trees

leaves cannot even touch it when they swing in the wind.

How to Fasten Rubber to Metal

Rubber matting used in automobiles can be secured to a metal surface by using a cement made of flake shellac dissolved in alcohol to form a thick syrup. Several thin coats carefully applied should be given to each surface, each subsequent coat to be applied before the last is dry. Press the rubber upon the coated metal, taking care to have all of the surface in contact, and by the use of a board and rather heavy weights, keep the surfaces pressed together for about 24 hours.

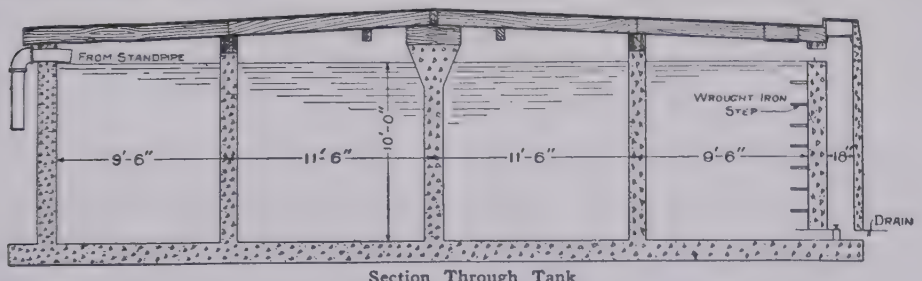
A Reinforced Concrete Reservoir

Concrete is fast coming to the front as a material for reservoir and similar construction. It is admirably adapted

Tank as It Appeared Without Top

for this work in view of its durability and permanency. It is rustproof, and has proven itself time and again a reliable and economical material for this class of construction. The cost is a feature which brings it easily within the reach of municipalities sufficiently large to install a waterworks system. The accompanying sketches taken from the Canadian Cement and Concrete Review are of a concrete reservoir recently constructed at Palmerston, Ont. The one sketch shows the tank as it appeared at the time of testing and before the roof was put on.

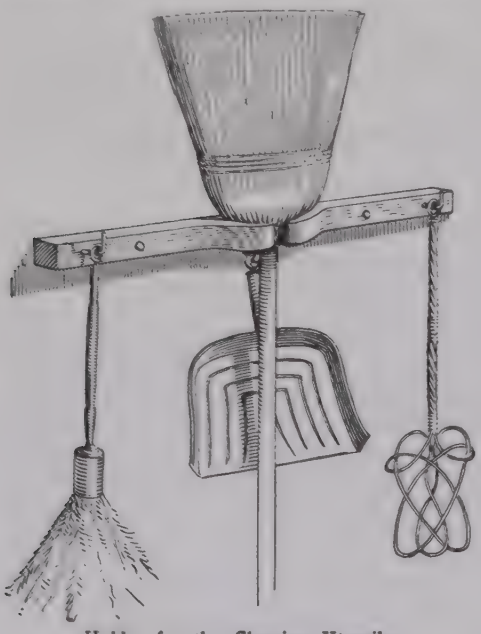
This reservoir has a diameter of 42 ft. and is 10 ft. deep with a capacity of 103,435 U. S. gallons. The walls are 12 in. thick and the roof supports 10 by 10 in. concrete posts. The horizontal wall reinforcement consists of ¾-in. cup bars placed 8, 12 and 16 in., center to center. The vertical wall reinforcement consists of ¾-in. cup bars placed 24 in., center to center. The columns for roof support are reinforced with four ½-in. cup bars, 12 in. long. Timber was used in the roof construction and is double-boarded to keep out the frost during the winter season.



Section Through Tank

Home-Made Broom Holder

In all well regulated households there is usually found a place for the broom, duster, dustpan and carpet



Holder for the Cleaning Utensils

beater. As these four articles have to do with the cleaning of the floors and furniture they should be kept in one place as convenient as possible. The accompanying sketch shows a holder that will provide a place for each one of these articles and keep them where they may be found when wanted.

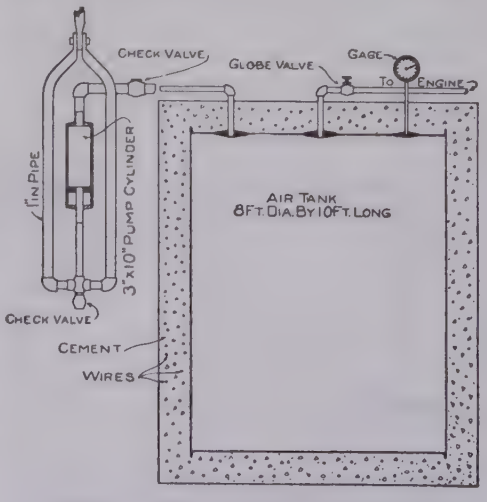
The holder is made from a board 1 in. thick, about 3 in. wide and 14 in. long. The ends are cut down so as to make them 1 in. square, leaving the center full width of the board with a notch cut in it to receive the broom handle. Two shoulder hooks are screwed into the outside edge of the wood, one at each end to make places to hang the duster and carpet beater. A plate hook turned into the underside of the wood and behind the broom handle makes a place for the dustpan. The wood is fastened to the wall with two nails or wood screws.—Contributed by Robert F. Washer, Sandy Hill, New York.

Steady Power Obtained From Compressed Air Pumped by a Windmill

There are some tools in nearly every blacksmith shop, no matter how small, that require a steady power of some kind or other to run. I had a small steam engine in my shop for a while, but soon found that I did not use it enough to pay me to keep up steam.

I then built myself a windmill, thinking that it would be cheaper than a gas engine, but the power it gave would not run the tools at a steady speed. The accompanying sketch shows how I finally won out and used both my windmill and steam engine.

I constructed an air pump which worked similar to an ordinary bicycle pump. Having a 3 by 10-in. pump cylinder on hand I made a piston for it, using a 1-in. gas pipe for a rod and a leather washer held between two flanges on one end of the rod for a plunger head. On the other end of the rod I screwed a 4-way pipe coupling and into this a nipple and vertical check valve as shown in the sketch. I then connected two upright pipes to the side openings of the 4-way coupling by means of elbows and nipples. The nipples I filled with lead in order to make



Details of Pump and Tank Construction

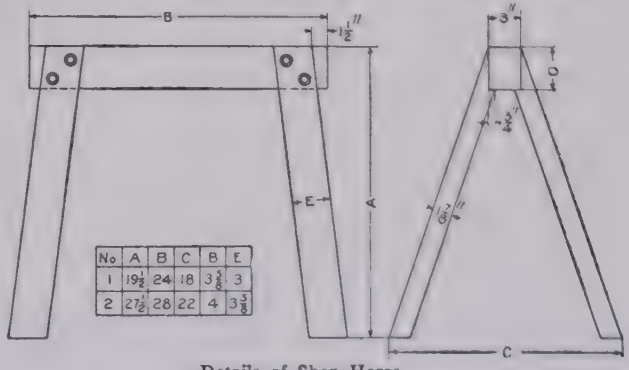
them air-tight. The upright pipes are bent together at the top and flattened

so as to make a connection for the pump rod of the windmill. On the top end of the cylinder is attached a pipe, with a check valve in it, and connected to a large air tank which I had a tinner make of heavy galvanized sheet iron. The tank is 8 ft. in diameter and 10 ft. long and is reinforced with concrete and heavy wire. A pipe line with a globe valve in it connects the tank to the engine. A gauge is also attached to register the air pressure. The pipes are fastened to the tank with heavy flanges.

The windmill which I made myself has a 16-ft. wheel and develops power enough to put 80 lb. air pressure in the tank and that pressure easily runs my 3-hp. steam engine. The tank fills about as fast as I use the air, thus I am able to run my engine for several hours at a time with practically no cost at all. The engine is well packed so as to utilize all the air with as little waste as possible.—Contributed by C. L. Perrin, Kerkhoven, Minn.

Design of a Shop Horse

Most machine shops have use for two or more shop horses, but if they are not well built and solid they are worse than none at all. The accompanying sketch and table gives the design and sizes of two different ones that will be found to be about right. Any mechanic can make them in a short time, care being taken to get the joints a good fit as this is what makes them stiff and solid when they are finished. Three-eighths inch carriage bolts should be used to bolt them together. Oak is the best wood to use and usually enough scrap pieces can be found about the shop to answer the purpose.—Contributed by Urban A. Towle, St. Albans, Vt.

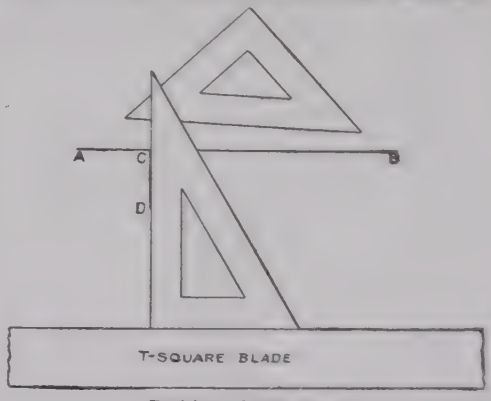


Details of Shop Horse

A good hard cement is made of 16 oz. fine cast-iron turnings and 1 oz. of sal ammoniac.

To Avoid Blotting Fresh Ink Lines

It sometimes becomes necessary for the draftsman to draw short vertical lines before the horizontal ink lines are

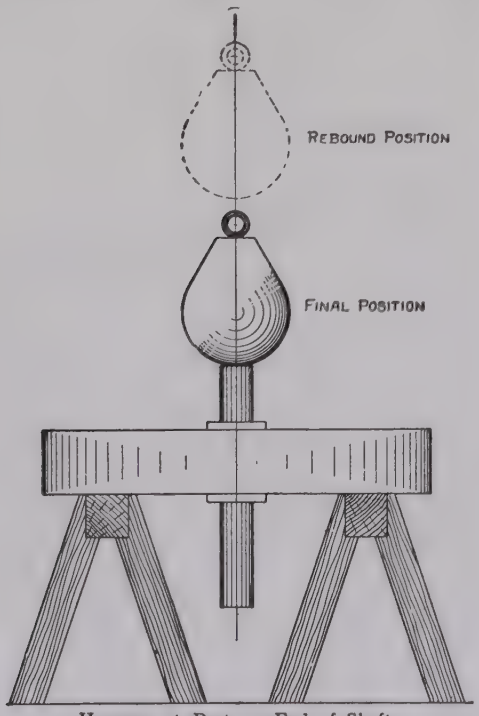


Position of Triangles

dry, and it is impossible to lay the triangle on them without causing a blot. The lines can often be drawn by laying one triangle over the other, says Machinery, to lift it off the paper, as shown in the sketch, when the line AB is supposed to be a freshly inked line, and it is desired to draw line CD without waiting for AB to dry. One triangle can be laid on the board just above A B with one edge approximately parallel to it. Then the upper end of another triangle can be laid over the first, its lower edge being guided by the T-square blade in the usual way. This lifts it clear of the line AB, and CD can be drawn just about as well as though the triangle were flat on the paper.

An Unusual Balancing of a Heavy Hammer When Dropped

In trying to drive a 6-in. shaft out of an old fly-wheel in the scrap yard of a foundry, a 1,200-lb. hammer was



Hammer at Rest on End of Shaft

dropped a distance of 20 ft. on the end of the shaft, rebounded, struck again, and rested there as shown in the accompanying sketch.—Contributed by Frank Hargroove, Columbus, Ohio.

An "Alarm" Chair for the Engineer

Once I was night engineer of a small electric railway power station. The station was as neat a little plant as you could ever find and she ran like a dream, says a correspondent of Electric Traction Weekly. My shift was a fluctuating period depending on what time Bill the day man showed up, and Bill's hour for rising was dependent upon a number of variable quantities as well as qualities. But usually I did from 14 to 16 hours at a stretch. As I was the only man around the plant during the night shift and the plant was way out in the country, I used to get pretty lonely along about 2 o'clock in the morning. We had the plant in such apple-pie order that there really wasn't anything for the night engineer to do except to make the rounds every half hour or so, feel of the bearings, look at the gage glasses and maybe pour a little oil into the oil cups.

Many a night I longed to tip back in my chair, put my feet on the desk and take about 40 winks, but my conscience wouldn't let me. I am one of those mortals that don't do things by halves, so when I sleep I do it right and I knew if I ever did get sound asleep Mount Vesuvius might go off in that engine room and I wouldn't know the difference. The alarm on an ordinary alarm clock only soothes me into a deeper sleep.

Well, one night when I was whittling a tooth pick out of a broomstick handle to keep awake I got to thinking harder than ever how nice it would be to put my head back and get a 30-minute snooze if I could only devise some means for waking myself up in time to ring in that infernal watchman's clock on the next round.

All of a sudden I had an idea but I didn't faint. I just reached for my pencil and worked the idea out. Then I got the cord and the fixings and put it together and it worked like a heaven-

Drops the Sleeper to the Floo.

sent blessing. The sketch will show the idea and all its details.

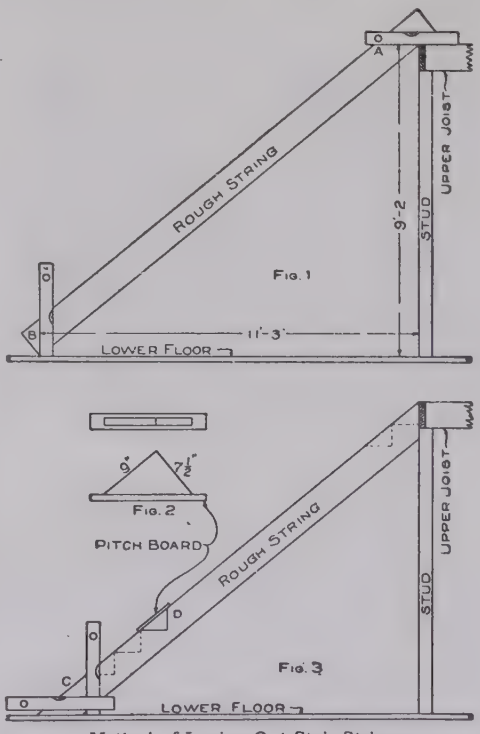
I took the alarm clock and attached a spool to the spindle that wound up the alarm spring. The clock I fastened down to a shelf with a strap. Then I arranged a lever as shown, one end of the lever being attached to a string that was fastened to the spool on the alarm clock spindle, so that when the alarm went off, the spool would revolve and wind up the string and this would pull the lever. This would knock off a 2-lb. weight which in falling from the shelf would jerk out a book that held up the hinged end of the shelf on which rested a 25-lb. weight. This would let the heavy weight drop, thereby jerking out the prop from the seat of the night engineer's chair, and the said night engineer would find himself sitting up straight, rubbing his eyes and wondering what happened.

Some of your readers may smile when they see this, but nevertheless this little "stunt" insured the writer many a much-needed nap without fear of oversleeping and neglecting his duties. By setting the alarm for the desired hour the chair would "work" at just the right moment to awaken me in time to make my rounds.

Short Cuts in Stair Work

A short and simple method of laying out stair stringers for a plain, straight flight of stairs is shown in the accompanying sketches. The lengths and cuts are secured by using the plumb and level at each end of the string, as shown in Fig. 1, and scribing as at A and B, says a correspondent of the American Carpenter and Builder. Then, by changing the string end for end, it will fit as shown in Fig. 2.

Next find out what rise you want. This depends on the space you have, but if there is sufficient room, the steps should be laid out with a 7 or 7½-in. rise. Suppose the height between the floors is 9 ft. 2 in., or 110 in. Dividing this by 7, we have 15 5/7 or 15 spaces, and by dividing 110 by 15, we have the exact rise which is 7 1/3 in. If there is plenty of room on the floor for the run, the tread can be made any chosen width. Suppose 9 in. is the desired width. By multiplying 15 by 9 we get the run on the floor, 11 ft. 3 in. The lower end of the string should be



Method of Laying Out Stair String

placed at this point as shown in Fig. 1. Then proceed, as already stated, with the plumb and level.

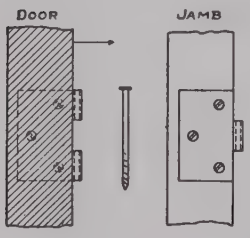
After obtaining these cuts, next divide the string into 15 equal spaces with a pair of dividers and again use the plumb and level in laying off the first notch as shown at C in Fig. 3. Carefully cut this out and use the piece for the pitch board, shown in Fig. 2. This is used to lay off the rest of the string as shown at D, Fig. 2.

Prussian blue and Chinese blue are both the same chemically but they do not cut or look the same.

When using dry cells in a damp place put them in a tight box and pour melted paraffine around them.

A Handy Door Lock

A very serviceable inside lock for doors can be made from a common door hinge by fitting it to the door and jamb as shown in the accompanying sketch. It is best to file down the bar which connects the hinge to make it move in and out more freely. When the door is to be locked, simply close it and drop a nail into the place where the pin of the hinge has been removed. This will be found a very handy and strong lock to be used in place of a bolt and it is much cheaper.—Contributed by F. G. Feeney, Chicago, Ill.



Dredging a Channel

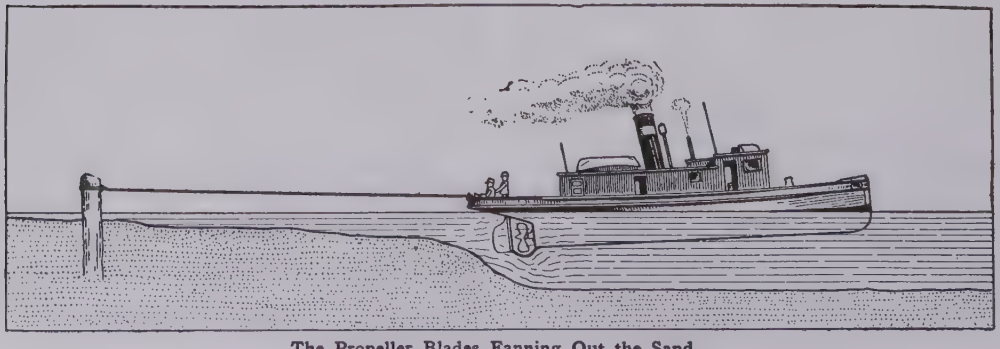
A family of fishermen living on a sandy beach on the shore of Lake Erie built a steam fishing tug in their back yard. They were laughed at for building a boat which they could not launch. The brothers, however, were silent and kept at their work. At last the boat was completed and moved to the water's edge where it rested on the ways. On the day set for launching the skeptics were on hand to watch the proceedings. A fishing tug was seen coming along shore and when it reached a point opposite the newly completed boat, a man came ashore in a row boat towing a heavy hawser. As soon as he beached his boat, he placed a loop of the hawser over a post on the shore and the tug immediately put a strain on the hawser. After fifteen minutes of furious steaming at a standstill the bystanders were surprised to see the tug back in a short distance toward the shore and repeat the operation. Fifteen minutes later she again backed up, and at intervals she continued to back up until finally after four hours the tug floated where the day before there was a depth of but 3 ft. Then she steamed out to sea through the channel which the screw propeller had literally "fanned" out of the sand. The lines were cut, the new tug slid down the ways and the skeptics drifted away as she struck the water.—Contributed by J. E. O'Brien, Buffalo, N. Y.

A Home-Made Torch

Here is shown a design of a home-made torch which has proven to be a success. Secure a piece of ordinary

Torch Made of Pipe Fittings

1½-in. gas pipe about 6 in. long and thread both ends. Screw a cap on one end and a 1½ by 1-in. pipe reducer on the other. Then a 1-in. pipe nipple about 3 in. long is threaded on one end and screwed into the 1-in. opening in the reducer. The nipple should be filed out smooth on the inside so the wick



The Propeller Blades Fanning Out the Sand

will pass through easily. The wick is made of cotton wrapping string which has been doubled several times. Coal oil can be burned in the torch but lard oil makes a better light and does not give off any obnoxious odors. This will prove to be a very handy torch for night watchmen and others who have to go into dark places.—Contributed by P. Wright, Santa Clara, Cal.

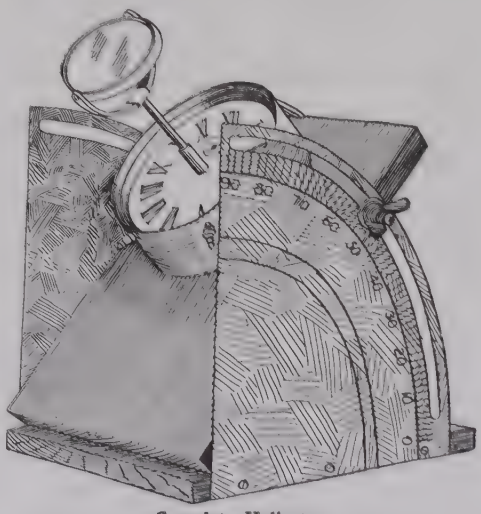
A Home-Made Heliostat

It is not always convenient to point a spectroscope to the sun, and if one did, the apparent motion of the latter soon necessitates the shifting of the instrument. This may be remedied to some extent by mounting a small hand mirror centrally on a ball and socket joint, so that it can be adjusted in all directions, says The Photographic Journal, England. With such an arrangement it is possible to direct the sunlight on a slit long enough to obtain excellent spectra, particularly when a wide slit is used.

For advanced work in the study of the solar spectrum a good heliostat is a necessity, but even the photographer who uses his spectrograph not only for the testing of plates and filters, but also for the occasional study of line spectra, will find such an instrument of great assistance.

Commercial heliostats are somewhat expensive, but quite an efficient instrument can be made in the following manner: To a wood base, about ½ by 6 by 12 in., is hinged a slightly smaller board, and in this board is cut a circular hole to a depth of ¼ in., large enough in circumference to take an alarm clock. Two quadrants of brass are nailed to the sides of the base, one of which is divided by means of a protractor into degrees and half degrees. A slot is cut out near the edge of each quadrant for two bolts with wing nuts to pass through for adjustment of the upper board to any angle.

The hands of the clock must be removed and an extra train of three wheels put in so that the center pinion revolves once in 24 hours. This part of the work can be done by a local jeweler that repairs watches and clocks. The center pinion is replaced by a



Complete Heliostat

small brass tube with a little screw having a milled head at the upper end. The mirror used in the making of this particular heliostat was one discarded from a microscope which had one side plane and the other concave. The original semicircular arms were retained, but filed down so as to reduce weight, an important point, considering the driving power of the clock. The supporting rod was made of aluminum.

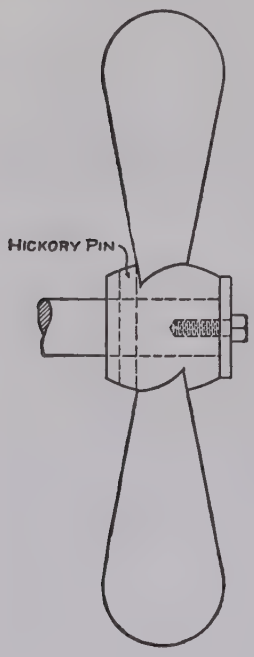
To use the heliostat the base is placed with its length accurately north and south, that is pointing directly at the sun at noon, and the upper board is inclined at an angle equal to 90 deg. less the latitude of the place of working. The mirror is then turned so as to face the sun, which should reflect the light in a line with its axle.

Sometimes it may be found inconvenient to place the spectroscope in the path of the reflected beam and then a supplementary mirror may be brought into play. Either the concave or plane mirror may be used, but with the former the focus is so short that the slit must be within a few inches of the mirror. With the plane mirror in use the heliostat may be a long way from the spectroscope.

The only other accessory which is useful with the heliostat is a condenser. If the plane mirror be used, the beam of sunlight considerably more than covers the slit, whereas if the image of the sun be formed by the concave mirror on the slit, it will be so small as to form but a brilliant stripe down the center of the spectrum with a fainter spectrum on each side. In nearly all cases, therefore, it is advisable to use the plane mirror and a condenser so adjusted as to completely fill the slit in the light.

Hickory Key for Propeller Wheels

Launch owners who have trouble with the breaking of their propeller wheels due to striking obstructions in shallow water, will find this little device of interest. Instead of keying the propeller wheel to the shaft in the ordinary way, drill a hole through the hub of the wheel and the shaft and drive a hickory pin in it as shown in the accompanying sketch. When the wheel strikes an obstruction instead of breaking the blade the pin will shear off, thus saving the wheel. A new pin can be put in in a few minutes' time and a lot of trouble and delay avoided. The wheel is kept from being lost by a washer and cap screw in the end of the shaft as shown.—Contributed by Charles C. Brabant, Alpena, Michigan.



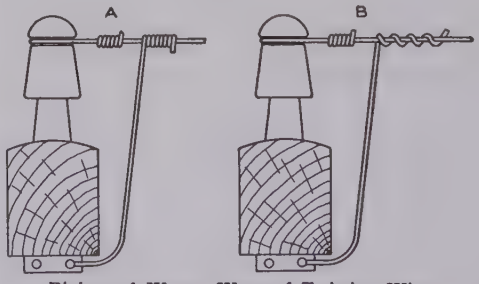
Open Circuit Caused by Wrapping Wire Too Closely

The following case of trouble proved interesting to me and may prove so to others, says a correspondent of Telephony.

The test showed that one side of the circuit was open (this trouble was in a straight metallic circuit on a magneto system). The first test was made at the office end of the cable, which showed the line O. K. to the board, so I then went out to the cable pole and tested in O. K. I then tested my bridle wires, only to find them O. K. and apparently well soldered to the line wires. Next I began to cover my line, driving about a mile and a half, where I stopped to test, and found the line open between this place and the office. I then recovered the line, testing every joint I came to. This series of tests led me back to the cable pole, where I located my trouble.

The joint which I supposed was well soldered proved to be the site of my trouble. The birdle wire was wrapped in close turns around the line wire, as shown in Fig. A in the illustration, and the solder had flown over the outside and not down to the line wire, thus leaving the soldering part to corrode the joint and cause the open joint.

Had this bridle wire been wrapped in a helix, as shown in Fig. B, such a case of trouble would never have happened, providing the wires were properly prepared and cleaned previous to soldering.



Right and Wrong Ways of Twisting Wire

Carburetor troubles are usually caused by dirt or water in the gasoline.

Collapsible Chicken Coop

The average chicken coop made of a soap box or some other small box is not always convenient for carrying around and use in different places. An A-shaped coop is little better than an ordinary box. The accompanying sketch shows a collapsible A-shaped coop that can be folded and stored away or carried and set up for use anywhere. The main frame is made in four parts and joined together with hinges as shown in Fig. 1. The frame can be covered with wire netting, or boards on the top part with netting on the ends. The hinged frames provide a way to open either end. A small

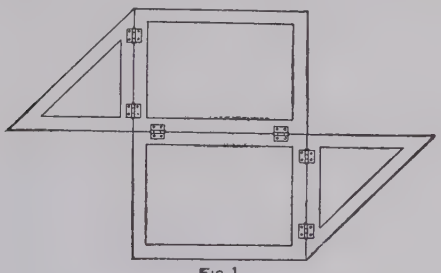


Fig 1

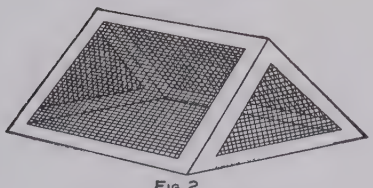


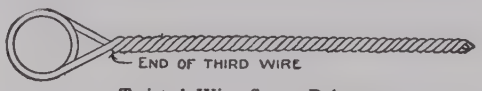
Fig. 2

Parts Are Hinged Together

hook and eye should be provided at each end to hold the parts in place.—Contributed by Miss L. Alberta Norrell, Augusta, Ga.

Home-Made Stove Poker

Many persons prefer a straight stove poker instead of a hooked one. In fact, a hooked poker is useless in some grates, but the trouble with a perfectly smooth and straight poker is that simply pushing it over or through a grate has little effect on the ashes. A poker that is straight and yet one that has something that will agitate the ashes is most desirable. To make such a poker I hit upon the idea as illustrated in the sketch. The poker is twisted from three strands of No. 8 or 9 steel wire. Drawing this poker



Twisted Wire Stove Poker

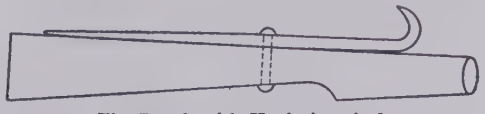
rapidly through the ash under a fire has a much more agitating effect than is possible to obtain from a smooth rod, moreover, it wears excellently.

This poker is made of two pieces of wire, one 6 ft. long, the other, 3 ft. Give the long piece one and a half turns around a suitable pipe or broom handle. Take the short piece and wrap one end of it securely around the pipe right against the other piece; then clamp the three free ends in a vise and twist the wires until the desired gauge is obtained, when the poker is cut to the right length and pointed. Finally cut off the third wire just below the handle loop and your poker is ready for use.

Four strands of smaller wire might be used in a similar manner. If ordinary straight wire is used and kept stretched in twisting, little or no straightening will be necessary when completed.—Contributed by O. E. Miller, Philadelphia, Pa.

Combined Belt Punch, Scratch Awl and Hook

The accompanying sketch shows a simple design of a common leather belt punch, scratch awl and hook, and will be found a very useful little article in repairing or lacing belts. After trying it, no one who uses belts will want to be without one, says a correspondent of the American Miller. The awl and hook is riveted to an ordinary belt punch, so that it can be turned in any desired position. The hook is for pull-

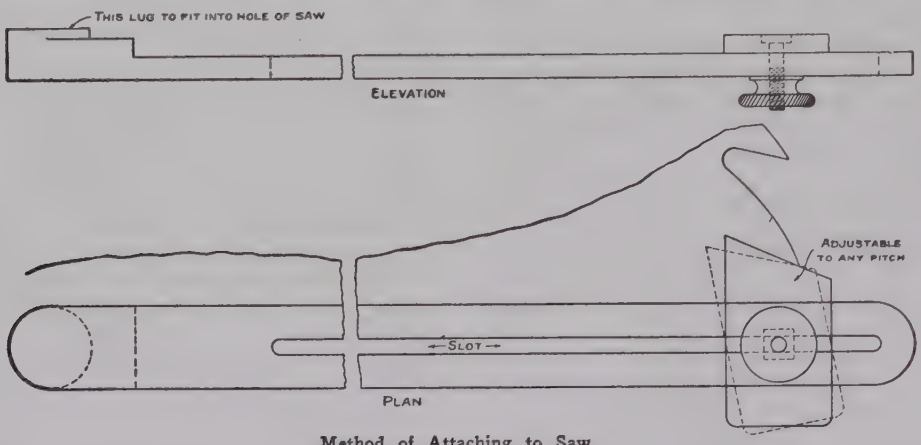


The Punch with Hook Attached

ing out the laces and the awl for enlarging the holes when lacing.

Tool to Mark the Pitch of Saw Teeth

The accompanying sketch shows a handy little tool for marking the pitch on circular saw teeth and will be of great use to those who have much saw filing to do, says a correspondent of the Wood-Worker. The total is very simple and easy to make and the size can be varied to suit the needs of the saw filer. The lug which fits into the hole of the saw may be made about 1 in. in diameter and will do for any saw with a hole 1 in. or over. The method of using the tool is: Place the lug in the hole of the saw, then fix the piece marking the bevel at the desired angle, and proceed to mark off the pitch of the teeth.



Method of Attaching to Saw

A Love Knot Cable Puller

Many times it is necessary to pull wires or ropes or cables through a pipe or conduit whose interior diameter is not large enough to allow for any way to fasten the pulling wire. A handy contrivance for overcoming this difficulty is the adaptation of the old familiar "love knots." Many of us have placed our fingers in the ends of these love knots with ease and then found to our surprise that we could not get them out quite so easily.

Love Knot Grip

To make this device take several wires, which will depend upon conditions, and double them at the middle so as to form a loop. Wrap them at this point to keep the ends in good shape and then proceed to weave them around the end of the cable or something of approximately the same diameter. The sketch shows the method. It is not necessary to weave the ends closely; in fact, it is better to leave considerable space between the separate wires, as the puller will better adapt itself to the different sized cables or ropes. After weaving far enough for each strand to encircle the cable several times, the ends may be held down by means of a string, rubber band or any other convenient means. If the loop is now pulled, it will be found that the love knot clings tightly to the cable and the harder the pull, the tighter the grip. If the knot is pushed from the end opposite the loop it may be slipped off the cable with ease. The same knot will fit cables having varying diameters. The flexible wire used ordinarily for hanging pictures will be found convenient for making medium sized pullers.—M. R. W.

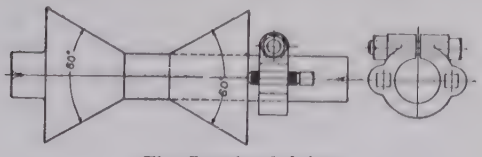
Dry batteries to be used in a cellar should be placed on a plate of glass to prevent any possible ground.

A Self-Centering Arbor

The self-centering arbor, shown in the accompanying sketch, can be made in any machine shop at a small cost, and does the work as well or better than some of the more expensive ones.

Secure a piece of steel of the proper size, for the work required, center and turn a cone on one end as shown in the sketch. Now turn a cone collar of the same size that will go on the shaft with a sliding fit. Also make a split collar and tap for two set screws as per sketch.

To use the arbor, the two loose collars are taken off the shaft and the work put on. Slide the cone collar on the shaft, small end first, then the split collar, which will clamp firmly to the shaft by means of the bolt. Now draw the set screws up tight and the piece is ready to be worked. If the tapered parts of the arbor are knurled, they will

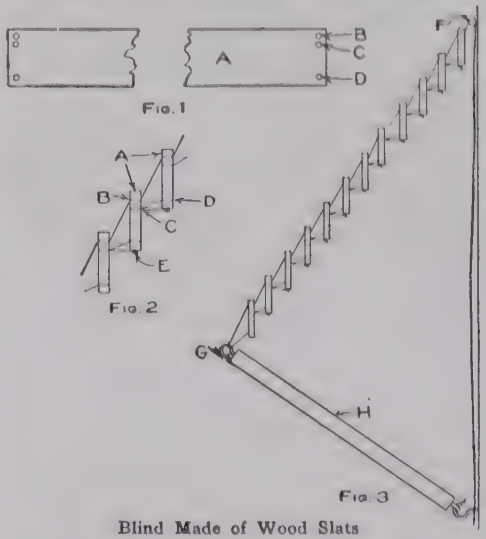


The Completed Arbor

grip the work more firmly and give a more powerful drive.—Contributed by Charles Stem, Phillipsburg, N. J.

How to Make a Slat Window Blind

The slat window blind is especially constructed to admit a circulation of air and at the same time keep out the sun's rays. A cloth shade or awning will hold the heated air in the upper part, as well as water on the top where the cloth sags. The slat blind or awning does not have these objections. The blind is constructed from 12 lath or slats. Each piece, as represented at A, Fig. 1, has three 3/16-in. holes drilled in each end, one (B) ¼ in. from the top, another (C) just below B and ½ in. from the top, and another ¼ in. from the bottom. Run a piece of string through the hole C in one piece and through hole D in the other; knot both ends so the string cannot pull out. Tie each slat together in this manner, as shown in Fig. 2. The length of this string can be varied somewhat, but it



Blind Made of Wood Slats

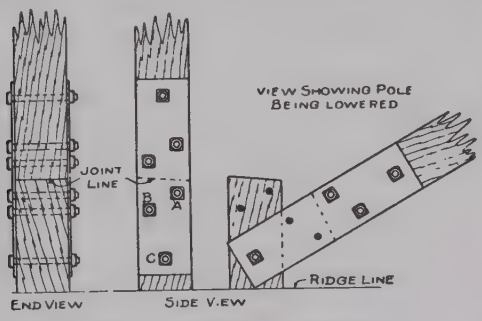
must not be too long or the slats will be far enough apart to let in streaks of sunlight. Another string is run through the hole C, knotted and tied to a nail E on the lower edge of the slat above. This is also shown in Fig. 2. Join all slats in the same manner and then run a heavy cord through the hole B in all of the slats.

Two broomsticks, H, with screweyes turned in each end, are used to keep the lower end of the blind out at a distance from the window. The heavy cord placed through the holes B and one from the hole D in the last slat are tied in a screweye on the end of the broom handle. The other screweye is placed on a hook that is turned into the window casing. The top end of the heavy cord is run over a pulley F, Fig. 3, and down the side of the window casing. A pull on this cord will draw all the slats up in a small flat bunch at the top of the window.—Contributed by Maurice Baudier, New Orleans, La.

In an emergency common pasteboard will make a good gasket for water or gas joints on an automobile. It is not good for the exhaust pipes on account of the excessive heat.

Hinge for Flag Pole

It is usually a difficult and dangerous task to rig a flag pole after it is once in permanent position. But it is a very



Joint and Method of Lowering

simple operation, if the pole is constructed with a hinge joint as shown in the accompanying sketch. The hinge consists of two steel plates bolted to the pole, one on each side. By removing the bolts A and B and gradually releasing bolt C, the pole can be lowered without much trouble. The size of the plates and bolts are governed by the height of the pole and the size of the flag. The joint should be cut at an angle so as to allow the top piece to clear the bottom piece when it is being lowered.—Contributed by Arch Owen, Youngstown, Ohio.

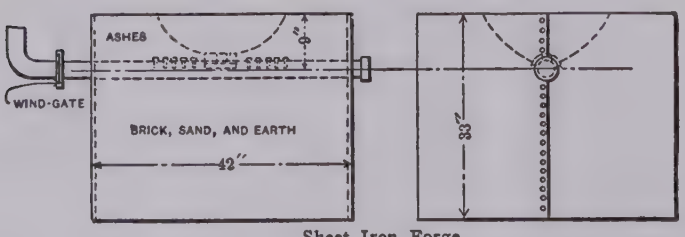
Repairing Cracked Water Jackets on Automobile Engines

Last fall the jacket water in both cylinders of my automobile froze and the expansion from the frozen water bulged and cracked the water jackets which were ⅛ in. thick, the crack being 6 in. long. A firm quoted a price of $35 to braze the broken jackets and this, combined with disconnecting, transportation charges, and replacing the cylinders, seemed too expensive for such a little break, and as no damage was done except to the water jackets I decided to try a compound consisting of equal parts of sal ammoniac, sulphur and iron filings. The filings I procured from the base of a blacksmith's anvil. The three parts were mixed together with water to a consistency of cream and allowed to stand for 30 minutes. An old broken knife was used to crowd this mixture into the cracks, then the openings at the bottom of the jackets were plugged with corks and the jackets filled with a solution of sal ammoniac and water. This solution was allowed to stand in the jackets for 24 hours, then drained and a new solution put in for another 24 hours.

This sealed the cracks completely and not a drop of water has leaked out and the car has been running for some time. The paste is so smooth that the break is not perceptible.—Contributed by Charles Hodge, East Bethany, New York.

A Home-Made Forge

A correspondent writing in Machinery describes the construction of a cheap forge, the body of which is made from ⅛-in. sheet metal formed into a cylinder with a diameter of 42 in. and 33 in. high. About 9 in. from the top edge two holes are cut opposite each other to admit a 2½ or 3-in. common steam pipe. The pipe to be used should have sufficient length to pass through the cylinder and have a 2-in. extension on one side and 6 or 8 in. on the other. The short end is fitted loosely with a cap so it may be removed and put on by hand. The long end of the pipe has a wind gate attached which is connected to the blast pipe. A 1¾-in. hole is drilled in the side of the pipe at a point where it will be in the center of the cylinder,



Sheet Iron Forge

and on each side of the hole three ¾-in. holes followed by two ⅝-in. holes about 3 in. apart, are drilled. The center large hole is protected with a piece of steel 1 in. thick, 4 or 5 in. wide and long enough to go one-third around the pipe, which is bent to fit the outside diameter of the pipe and attached with some fire clay directly over the hole in the pipe.

After the forge constructed in this manner is leveled up, broken brick, sand, dirt and cinders are dumped in and packed firmly up to the lower side of the pipe. The small holes in the pipe are filled with ½-in. bolts or rivets that are about 1½ in. long, and then the remaining part of the cylinder is filled up with cinders and packed firmly, space being left to form a pit for the fire.

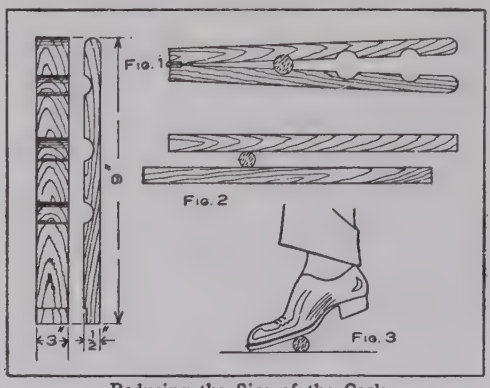
If a long fire is required in this forge, enough cinders are picked out to uncover the extra holes in the pipe, and the bolts or rivets mentioned taken out; the length of the fire can be adjusted to the requirements by taking out more or less bolts.

When the fire gets dirty, use the poker and poke the dirt down through the hole. Take off the cap at the end of the pipe and open the wind gate and blow out the cinders inside of the pipe. It takes no more than two minutes to clean a fire in one of these forges.

How to Fit Corks

Occasionally odd-sized bottles are received in stores which require corks cut to fit them. No matter how sharp a knife may be, it will leave some sharp edges after cutting the cork which will cause leakage. The illustration shows three very effective methods of reducing the size of corks. The one shown in Fig. 1 is made from two pieces of ½-in. wood fastened together at one end with a common hinge. Two or three grooves are cut crosswise in sizes desired. The cork is put into the groove and both pieces are pressed together, which will make the cork smaller.

Rolling the cork between two flat surfaces (Fig. 2) is simple and almost as good as pressing in the grooves. A

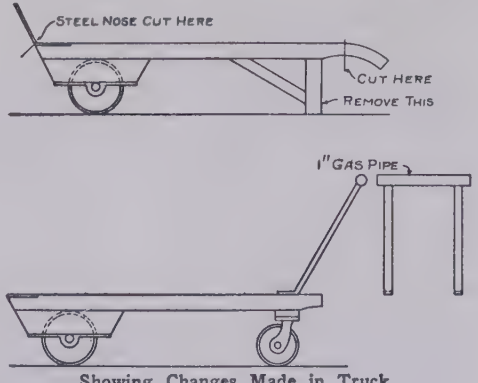


Reducing the Size of the Cork

cork rolled on the floor (Fig. 3) is a quick and effective way. A slower and equally as good way is to soak the cork in hot water for a short time.—Contributed by L. Szerlip, Brooklyn, New York.

A Handy Mill Truck

The accompanying sketch shows how a four-wheel truck was made out of a two-wheel one, says a correspondent of the American Miller. The steel nose, the wood handles and the iron legs were removed from an 800-lb. truck as shown in the sketch, and the upright handles and casters put on. The result is a four-wheel scale truck which has proven to be the handiest

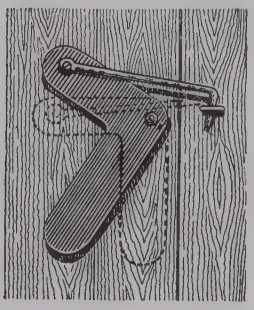


Showing Changes Made in Truck

truck in the mill. One can put on the load, weigh it and run it wherever wanted.

A Barn Door Latch

The regular hook and staple placed on a sliding door does not always close the joint tightly. The accompanying sketch shows the construction of an attachment for a common door hook that will draw the door close to the door jam. The L-shaped piece is made from sheet metal and fastened to the door with a small bolt or large wood screw. After the hook is placed in the staple, the sheet metal handle is drawn in the position shown by the dotted lines, which draws the door closed. The position of the bolt in the sheet metal and screw of the hook are so arranged that the pull will have a tendency to keep the parts closed.—Contributed by H. H. Nelson, Rose Lawn, Ind.

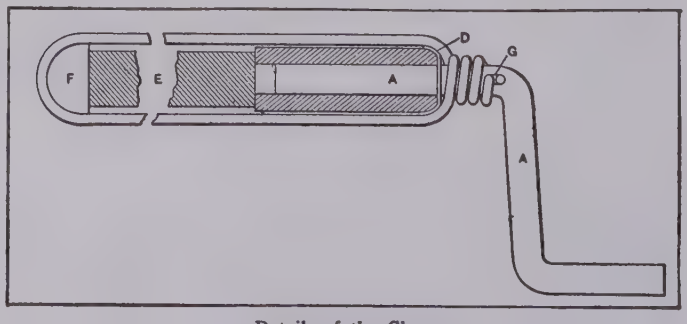


A Clamp to Hold Long Work

Many of the handy tools are constructed by the mechanic when a particular job requires something out of the ordinary. Such a case comes to light in an article given by a correspondent of Wood Craft describing a new clamp originated by a workman who was making a screen frame of unusual proportions. As the clamps on hand were not long enough, he constructed some that could be used for almost any size of work.

For the material he took a piece of ½-in. round iron and bent it into a crank, A, as shown in the sketch. Two holes were drilled through this crank close together as shown at G. A ½-in. hole was bored into a block of wood a little thicker than the stock to be clamped. This block was placed against one side of the work and the block F against the other. The wire B was drawn around the frame and blocks and the ends put through the holes G from opposite sides. Turning the crank would wind the wire around A. A washer, D, with its edges bent a trifle, was placed under the wire to keep it from cutting into the wood.

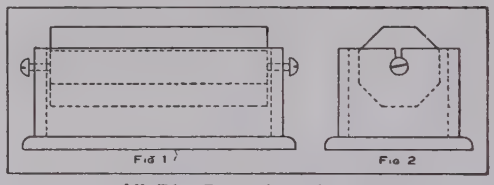
The same wire cannot be used on many jobs of the same size as the ends will not stand very much of such short bending. The device was intended only as a makeshift for extra long jobs. The clamp is capable of considerable variation and of a wide range of use.



Details of the Clamp

Another Pencil Sharpener

This sharpener can be handled without getting the hands, drawings and clothes covered with lead. The device consists of a hexagonal piece of wood covered with sandpaper and supported on an axle that fits into the ends of a small box. The box will catch all the lead and wood removed from the pencil. Figure 1 shows a side elevation and Fig. 2 the end.—Contributed by J. H. Crawford, Schenectady, N. Y.

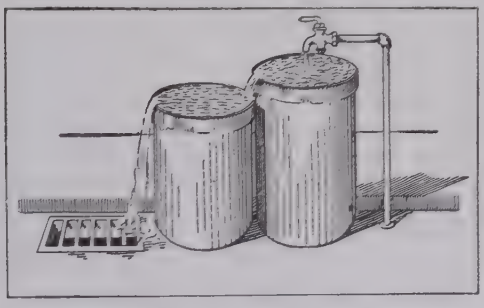


All Dirt Drops into the Box

SHOP NOTES

Watering Trough Made of Cast-Iron Pipe

A practical and useful trough for horses can be made from heavy cast-iron water main pipes as shown in the illustration. An eastern city makes use of such a watering trough in one of the main streets. Two large pipes are placed on end with the flanged part upward, one to overlap the other so the water may flow from the first one, which is fed by the water pipe, into the lower one, then into a near-by sewer.

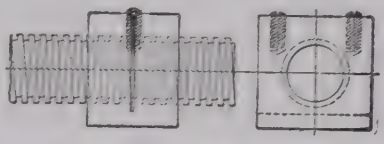


Water Mains on End

The bottoms of the pipes are made tight with cement.—Contributed by T. Canary, Chicago.

How to Repair a Worn Lathe Lead Screw Nut

Every machinist knows how annoying it is to cut threads in a lathe with a worn lead screw nut. A simple method of taking up the slack in the nut is shown in the accompanying sketch. Saw the nut nearly through with a

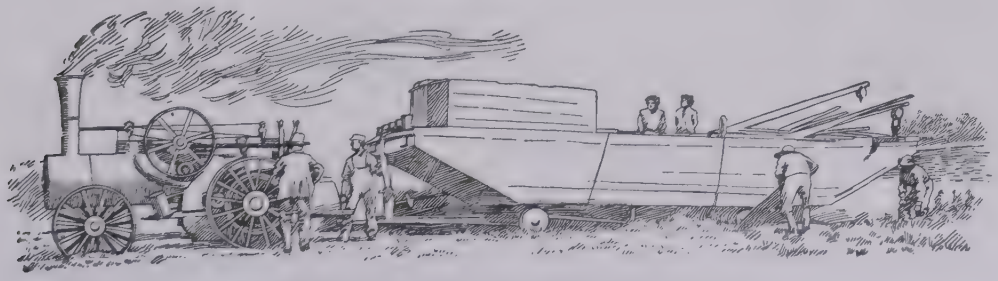


Taking Up the Slack in a Nut

hacksaw. Then drill and tap holes for a couple of taper screw plugs as shown. When these are screwed in place they will spread the nut enough to take up all the slack. This simple remedy will save the nut for a long time.—Contributed by C. Purdy, Ghent, Ohio.

Traction Engine Hauling a Scow

A home-made scow equipped with an 8-hp. gasoline engine was used on Gananoque lake, Ontario, for freight. The owners decided to remove the scow from the lake and place it in the waters of the St. Lawrence river. The scow was rowed down the Gananoque river, as some places are very shallow, hauled out of the water and mounted on a home-made truck having wood wheels. A traction engine was hired to pull the truck with its load. The engine accomplished its part easily and the scow was soon launched in the river.—Contributed by Wilfred Henderson, Gananoque, Ont.

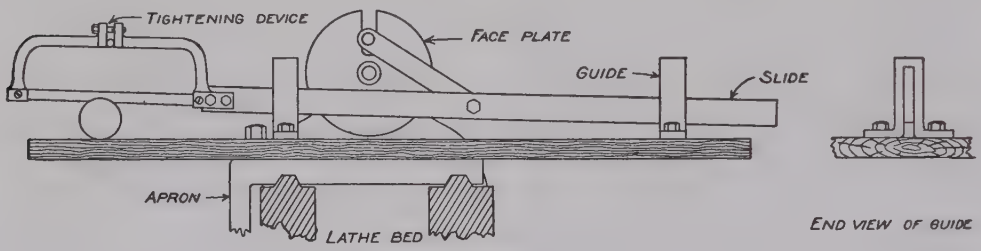


Transferring the Scow from the Lake to the River

Hacksaw Attachment for a Lathe

The power hacksaw attachment for lathes as described in the following is one of the handiest tools about the small shop, and is inexpensive and easy to make.

The entire working parts are mounted on an oak plank, 1 in. thick. The plank in turn is bolted to the lathe apron by means of two ½-in. bolts placed in the grooves. The device consists principally of a slide, two supports one at each end of the slide, a connecting rod for operating the slide, the saw and saw frame.



The Hacksaw Attached to a Lathe

The slide is a flat piece of cold rolled or machine steel, ⅜ in. thick, 4 in. wide and with a length depending on the size of the lathe and length of stroke required. A hole is drilled near the center of the slide for the bolt holding the connecting rod.

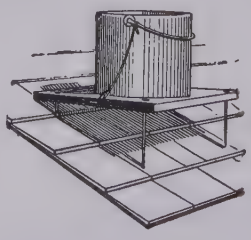
The two supports used to guide the slide are made of brass for convenience in bending and are about ⅜ in. thick and 2 in. wide, the length depending on the height of the guide. A very small clearance is given for the slide and good service will depend on a liberal application of grease. A small filler of brass is used to keep the slide from rubbing on the board. Two ½-in. bolts hold each of the supports to the wood base.

The connecting rod is merely a strip of flat steel about ½ in. thick, 2½ in. wide and of a length suitable for the stroke wanted and the size of the lathe on which the saw is used. This is connected to the faceplate of the lathe and the slide by means of a couple of ¾-in. bolts. The stroke of the saw depends on the distance from the center of the lathe spindle to the bolt on the faceplate. Decreasing and increasing this distance shortens and lengthens the stroke respectively. If the lower edge of the faceplate comes below the top edge of the slide, the connecting rod will have to be built out from the slide by means of washers to prevent the bolt on the faceplate from striking the slide. This also depends on the swing of the lathe.

The saw and holder is extremely simple and efficient. The tightening of the saw is effected by drawing up on the bolt. The frame is made of light steel forgings. The device will be found useful in many shops where the work is not sufficient to require an expensive machine.—Contributed by J. H. Crawford, Schenectady, N. Y.

A Roof Painter's Pot Jack

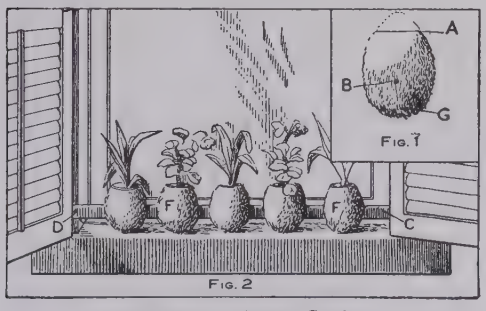
The paint pot is a cumbersome thing to handle when painting on a roof and for this reason I constructed the pot jack, illustrated in the sketch. The jack consists of a board about 7 in. wide and 8 in. long with nails driven through each corner for legs. Two short nails are driven in one end and two spikes in the other. The length of the nails will depend upon the pitch or slope of the roof in making the board rest horizontal when their points stick into the shingles. The paint pot is secured to the jack by a



cord or small wire attached to the bail and hooked over a small nail driven into the edge of the board. The jack will prevent overturning the paint and will lessen the danger of the painter falling from the roof in trying to hold his paint pot.—Contributed by A. M. Bryan, Corsicana, Tex.

A Window Flower Garden

An attractive set of flower pots made of cocoanut shells, to take the place of a window box, is shown in the accompanying sketch. After extracting the milk from the cocoanut, cut the shell on the line A and carefully bore a hole at B. Dye or stain the shells dark green and fasten them with screws through the holes B to a strip of wood C, ¼ in. thick, 1½ in. wide, as long as the window is wide, and painted green to match the stained shells. The stick can be of such a length as to fit the



Cocoanut Shell Window Garden

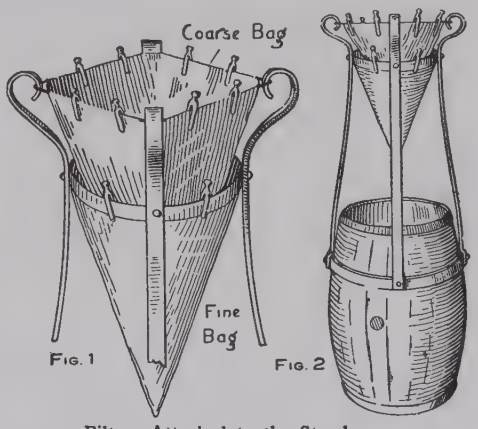
lower end of the window frame stile of the upper sash, or to slip in behind the outside shutters.

The shells will rest against the window sill. The holes G, used for extracting the milk, will serve to drain off the water when the plants are watered. Fill the shells with earth and set the plants in the same as an ordinary flower pot.—Contributed by Maurice Baudier, New Orleans, La.

Duplex Filter Holder Stand

The iron frame of an ice water cooler stand when inverted provides a way to hold a fine and a coarse cloth for filtering liquids.

The two filters may be used simultaneously, one being hung on a wire stretched through the loops of the feet,

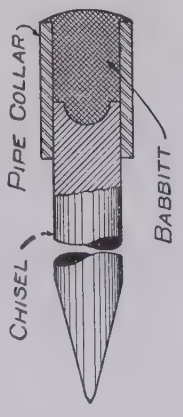


Filters Attached to the Stand

and the other on the circular iron brace a few inches above the feet. Both filter cloths are fastened with common wooden clothespins. Use the top wire for the coarse filter and the bottom one for the final straining, as shown in Fig. 1. The stand may be securely placed over the top of a cask, as shown in Fig. 2. This device saves time in handling liquids, as it filters twice at one pouring.—Contributed by Jas. M. Kane, Doylestown, Pa.

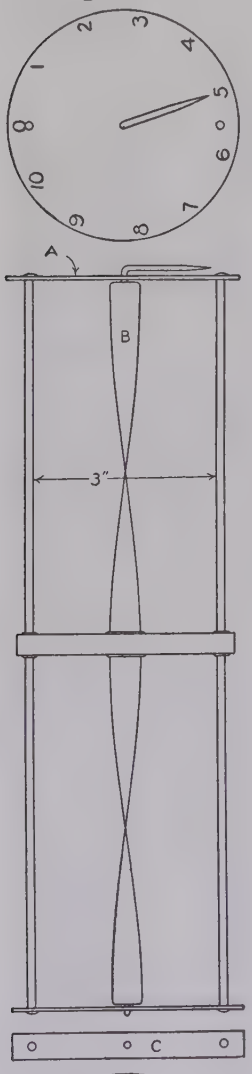
A Soft Head for a Cold Chisel

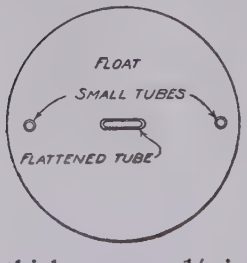
A new design of a cold chisel, that does not have the loud noisy click and the jar common to others, is shown in the accompanying sketch. Drill a hole in the head of the chisel, then drive a pipe collar over the end as shown and pour it full of lead or babbitt. This babbitt robs the chisel of the jar and does the work as well. A chisel fixed like this will stand some hard usage and when the babbitt is worn down, the collar can be refilled in a few minutes. —Contributed by H. C. Faber, Monongah, W. Va.



Gauge for Gasoline Tanks

The usual method of finding out how much gasoline a tank contains is to insert a stick, ruler or whatever happens to be handy that will go through the opening, and note the height the liquid dampens the wood. This is an uncertain method as gasoline evaporates rapidly. If a clean stick is not selected, particles of dirt are liable to be left in the liquid which will get into the carburetor and cause trouble.





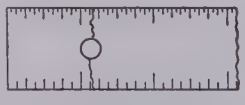
The accompanying sketch shows how to construct a gauge that will indicate the exact amount of gasoline in the tank at any time. From a piece of sheet brass cut three circular disks, two of them 3½ in. in diameter and the other 4 in. in diameter. Secure two brass rods $\frac{3}{16}$ in. in diameter and as long as the tank is deep and solder them to the larger brass disk A as shown in the sketch. Cut a strip of $\frac{1}{16}$-in. thick copper, ½ in. wide and with a length equal to the length of the wires, and twist it into one complete turn, making a spiral as shown at B. On one end of this spiral strip solder a piece of copper wire 1½ in. long and on the other end a piece about ¼ in. long.

The float is made of a strip of brass ½ in. wide and 5½ in. long, the ends of which are soldered together, forming a complete circle. The two smaller brass disks are soldered on the sides of this circle, making an airtight float. This float must have two brass tubes, slightly larger than the brass rods, soldered into it 3 in. apart, also, a flattened tube soldered in the center for the spiral strip to slide through freely. The air in the float must be at atmospheric pressure. This can be accomplished by drilling a small hole in the float and setting it on a cake of ice while soldering it up.

Drill a hole in the center of the disk A, large enough to admit the long copper wire on one end of the spiral strip, the end of which is bent over to make the pointer. Slide on the float. Cut a strip of brass, C, 1 in. wide, 3½ in. long and drill a hole in the center large enough for the copper wire, and solder it on the lower ends of the brass rods. Empty the gasoline tank and make a hole in the top 3⅝ in. in diameter. Put the gauge in the tank and solder around the disk A. Make a zero mark where the pointer stands, then put in 1 gal. of gasoline and make a figure 1, and so on until the tank is filled. The half gallons, or even quarts can be marked in the same way.—Contributed by Claude M. Sessions, Waynesville, Ill.

Mending Broken Celluloid Articles

Very often articles of celluloid or xylonite such as draftsmen's scales, curves, or triangles, are broken and discarded as useless. They can be mended very easily in the following manner: Immerse the broken parts in



ether until they soften, then apply a liberal application of collodion and press ends firmly together and keep them so by placing between two flat-irons heated to about 200 deg. F. Leave them in this position over night in a warm place so as to completely expel the ether and alcohol of the collodion. Trim off the surplus collodion and the result is a perfect and invisible joint. Be careful not to inhale much of the fumes from the ether and collodion and keep away from any open flame. The accompanying sketch shows a broken scale that was mended in this manner and is now as good as new.—Contributed by G. E. Kastengren, Seattle, Wash.

How to Make a Lead Coffin

The old-time method of making lead coffins was either to cast them in one piece and solder on the lid, or else to cast the sides, bottom, ends and lid in separate pieces and solder them together on the inside and lastly, when ready, solder the lid from the outside.

During recent years the coffin proper is lined in a manner similar to a sink or cistern and after the wood part has been placed inside, the lead cover is soldered at the outside edges.

Figure 1 shows a wood shell covered in the most common manner. Grooves are formed on the bottom against the outside angles, as shown in Fig. 2, and the center of all ends is also shown in

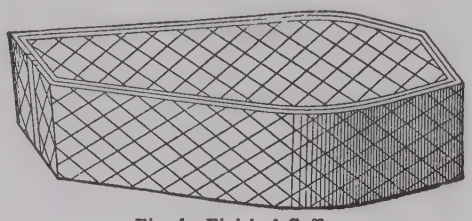


Fig. 4—Finished Coffin

dressed into the grooves and bossed over the corners at the bottoms and at the ends, and the top is dressed over the edge of the shell and over a chamfered edge on the inside as shown in Fig. 2.

The lead covering is usually cleaned and brightened with wire card. The lead is well chalked and then rubbed with a raw potato which, in combination with the chalk, prevents the solder from tinning beyond the edge of the shaving. The seam is then wiped flush in the ordinary way, the chalk washed off, and the whole surface scoured with a wire card.

When the body is in the shell the lid is placed in position and the seam soldered flush, after which the lid of the outer case is screwed down.

The usual weight of the lead is from 5 to 6 lb. per foot and about ½ lb. of solder to the foot is generally sufficient.

When the outer case is lined with lead the shell is placed inside and as it does not fit tight to the sides of the case a supplementary wood lid is made to fit the case exactly, just below the top edge, then the lead cover is put on

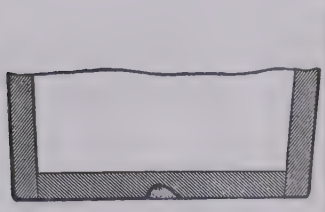


Fig. 1—Ordinary Method

Fig. 2—Showing Grooves

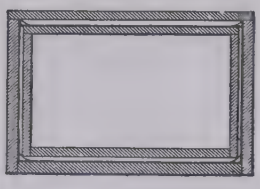
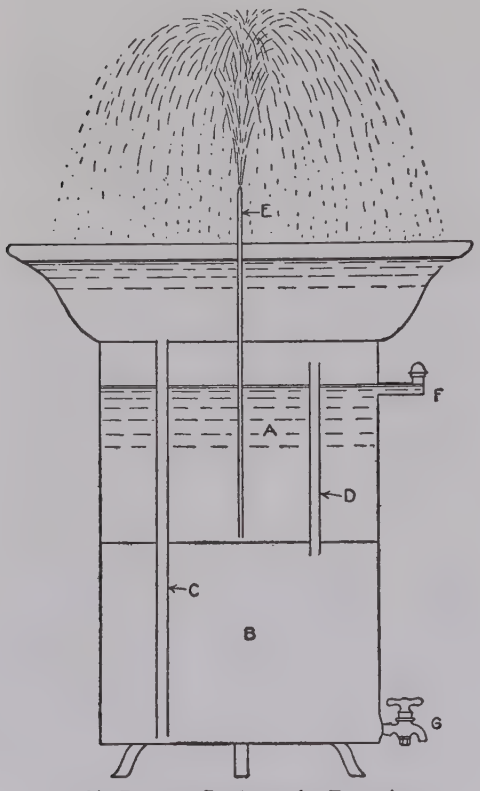


Fig. 3—Putting Cover On

Fig. 1. The bottom is in one piece and the edges are dressed into the grooves. The sides and half the ends are made in two other pieces and the edges also as shown in Fig. 3 and a seam wiped in the angle, the sides of the inner lining being left standing upright. Figure 4 represents the completed coffin.

Automatic Fountain

The fountain illustrated herewith is self-contained and works entirely by water and air pressure, both of which are supplied by its own tanks. The



Air Pressure Produces the Fountain

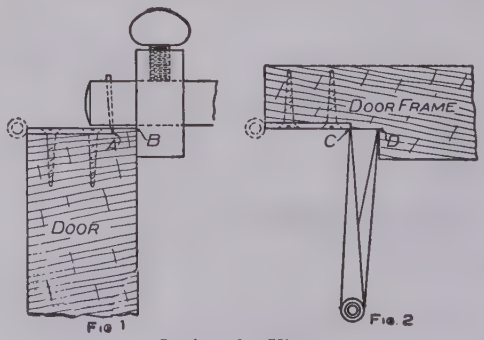
fountain will make a fine window display if it is provided with feet and set on a glass plate so it will be seen that no outside pressure is applied to it.

The main body of the fountain is a tank of about 10 gal. capacity which is divided into two separate compartments, A and B. These compartments are connected with ⅜-in. pipes, C and D, the pipe C extending through A and into the basin at the top. The tube E for the fount is a ⅛-in. pipe, tapering at the top end so as to make a fine spray of water. Be sure to solder all joints airtight. An opening, F, for filling and a drain cock, G, are soldered in the side of the tank as shown. The opening should have an airtight cover.

When the fountain is complete, fill the tank A up to the opening F and cover the latter. Pour some water into the basin and the fountain will begin its work. If properly constructed and all joints made perfectly airtight, the water will flow for about 6 hours.—Contributed by R. F. Wahl, Morrisonville, Ill.

The Right Way to Hang a Door

Many carpenters have considerable trouble in hanging doors so they will swing correctly at the first trial. A few simple rules are given here which if closely followed will give a successful result. When preparing to fit a door always turn the hollow side of the door towards the frame if possible. For varnished work fit the door so that a silver quarter-dollar will just slip in between the door and the frame on either side. For painted work a little more space should be allowed. Set your gauge at the proper distance (A-B) and always gauge from the frame side of the door as shown in Fig. 1. When the hinges are to be let into the door set your door in the opening, raise it to the proper height and mark with a knife the top and bottom of each hinge. Now set your compasses $\frac{1}{16}$ in. more than the gauge A-B, and scribe for the frame part of your hinge within the marks made with the knife at the top and bottom of each hinge, keeping one leg of the compass against the rabbet



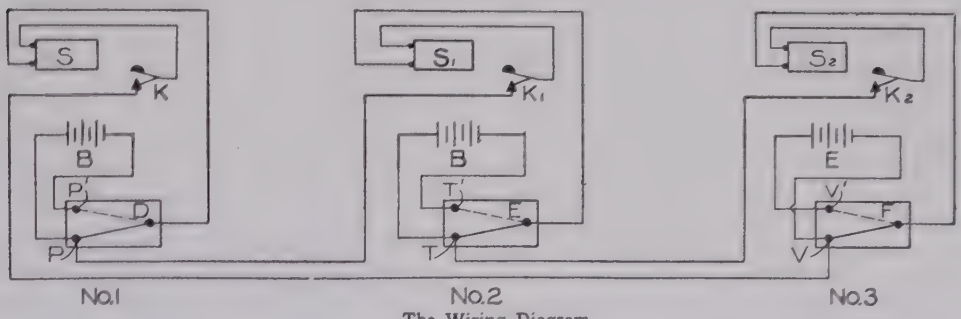
Setting the Hinges

of the door frame, as shown in Fig. 2. Now cut out the frame and the door to a proper depth for the hinges accord-

ing to the marks just made. Fasten the top half of a hinge to the door to match the other half screwed to the top of the frame. Leave the whole hinge fastened to the bottom of the door. Set the door in place and connect the top hinge with the pin. Open the door to right angles with the frame and screw the lower hinge to the slot in the lower part of the frame and the door is hung. If these directions are carefully followed your door ought to swing just right the first time.—Contributed by Ed. A. Peacock, Cincinnati, O.

tor No. 3 wishes to send a message to operator No. 1, he simply throws his switch from position V to V1, opens his key (K2), and calls No. 1. After the message is sent, operator No. 3 closes his key and throws his switch to the former position. In this manner the current is flowing only during the time the message is being sent. In case one operator calls another and the current is weak the operator called can increase the flowing current by throwing his switch into the upper position.

Thus you can have a closed circuit and still use dry batteries. This



The Wiring Diagram

Using Dry Cells of Battery on a Telegraph Circuit

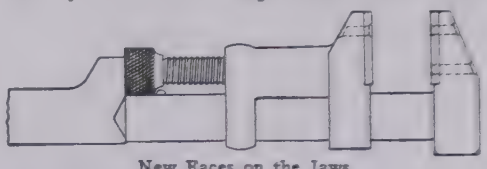
A new method of connecting a two-wire telegraph circuit so that dry cells of battery can be used instead of wet cells, is shown in the accompanying sketch. A telegraph circuit must be closed in order that one operator can call another. On this account wet cells are used in the ordinary circuit, as dry cells would deteriorate in a short time on a closed circuit and would have to be replaced frequently.

When the circuit is wired as shown in the sketch it is possible to use dry cells, and at the same time have a closed circuit when one operator wishes to call another. Double throw switches are shown in the diagram at D, E and F. S, S1 and S2 are the sounders and K, K1 and K2 are the keys of the respective operators, No. 1, No. 2 and No. 3. When the keys are closed, and the switches are in the position shown, there is no current flowing through the circuit. Suppose opera-

method of wiring telegraph circuits has been tested and gives perfect satisfaction.—Contributed by Wm. S. McGraw, Blacksburg, Va.

Repairing Monkey Wrenches

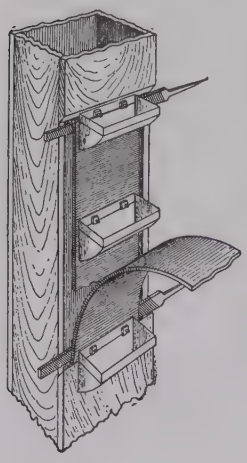
Monkey wrenches that have the jaws badly worn or sprung can be repaired very easily in the following manner: File the faces of the jaws up true, cutting them back about 1/16 in. as shown in the accompanying sketch. Make two tool steel plates ⅛ in. thick that will just fit the depression filed out


New Faces on the Jaws

and drill holes for rivets as shown. Harden the plates and then rivet them fast and you will have a wrench as good as new.—Contributed by R. Ench, Philadelphia, Pa.

Taking Slack from Elevator Belts

The slack in elevator belts may be removed with the use of two large files. The sketch illustrates the files in place and the belt apart, ready to have the slack taken out. Loosen the set screw in the pulley at the head of the elevator, remove the door from the elevator leg, and pull the belt around until you have the splice at the opening. Hang the first cup below the splice in the belt out over the leg cap at the bottom of the door, place the file back of the cup and belt, across the leg, letting the file rest on the fillers as shown. Take hold of the belt and pull down, taking out all the slack you can, says a correspondent of American Miller.



The second or third cup above the splice will come out at the top of the door, depending on how much slack there is in the belt. Hang the top edge of the cup on the leg cap at the top of the door and place the other file at the back of the cup and belt across the leg, letting it rest on the fillers as before. The belt will now be tight and fastened with the files. Open up the splice, cut out the slack, and fasten back with the bolts in the usual way, pull out the files and the cup will jump back into place. The reason for using the files is that they are rough and will not slip.

Another Way to Repair a Cracked Water Jacket

Place the cylinder over a basin and stop the water inlet at the bottom with a plug of some kind. The water space is now filled with a slightly concentrated solution of sulphate of copper through the water outlet at the top of the cylinder. At first the solution will rapidly leak through the crack and must necessarily be dipped up and poured through the top opening again. After repeating this operation a few times, the leakage will begin to slow up and will be gradually reduced to a sweating, and this will cease at last. Allow the solution to remain in the jacket about a day, and the repair will be permanent.—Contributed by W. O. Hay, Camden, S. C.

A Water Monoplane

Standing on a monoplane which is rapidly towed after a motorboat is a thrilling pastime for the bather. If he

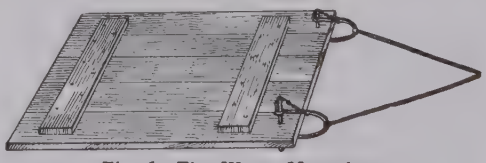


Fig. 1—The Water Monoplane

stands well back on the rear part of the boards, the plane will glide along on the surface of the water, a step or two forward will cause it to go beneath the surface and he will be passing through knee-deep water. The water monoplane while traveling at a rapid speed is a hard thing to keep right side up and for the rider to keep on board.

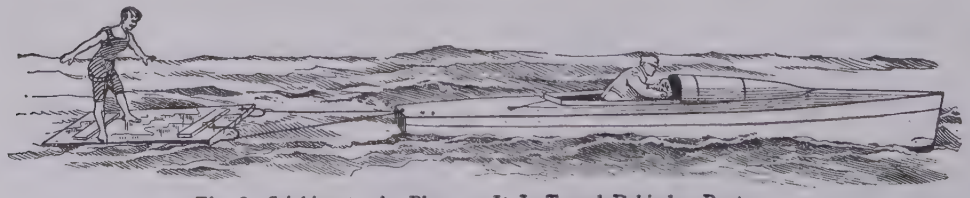


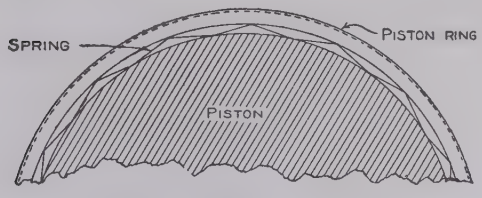
Fig. 2—Sticking to the Plane as It Is Towed Behind a Boat

The plane is made by nailing two cleats across several boards and attaching two clevises at one end as shown in Fig. 1. The manner of riding on board is shown in Fig. 2.

Method of Expanding Worn Piston Rings

Some one has suggested as a remedy for worn piston rings on a gasoline engine when new rings are not at hand, to slip a corset steel under each ring so as to expand it.

In some cases the foregoing plan will not work with success, but if you use a corset steel the same width as the ring and bend the steel every inch so as to make it look like an old-fashioned rail fence and then insert it under the ring it will give expanding pressure every 2 in. This is a successful remedy for worn piston rings in every instance where the bent steel springs are applied.—Contributed by X. D. Johnson, Merna, Nebr.

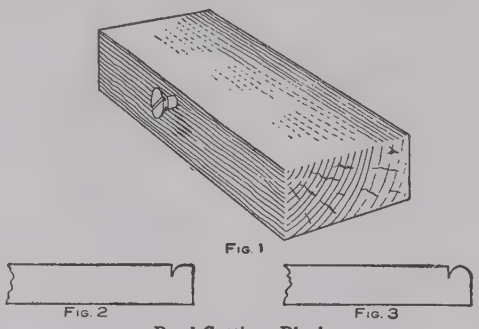


Bent Steel Under the Piston Ring

A Home-Made Bead Plane

A bead plane is not always necessary when a bead is required on the edge of one or two boards. A simple device for making a bead of any width is shown in Fig. 1. Secure a small block of wood and place an ordinary flat-headed wood screw near the end and top edge of one side and screw it into the wood until the head projects the distance equal to the size of the bead wanted, leaving the slot in the angle as shown.

Place the block against the edge of the board where the bead is wanted and draw it toward you, the head of the screw will make a groove as shown in Fig. 2. Take a piece of sandpaper or a plane and round off the outside corner and this will leave a finished bead, Fig. 3, equal to that done with an ordinary beading plane.

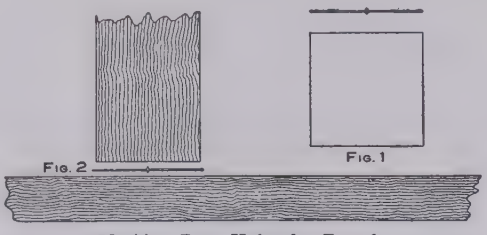


Bead-Cutting Block

The bead can be varied in width by simply turning the screw in or out, and larger or smaller beads can be formed by using larger or smaller screws.—Contributed by W. Arthur Mitchell, Newburgh, N. Y.

Tool for Marking Dowel Holes

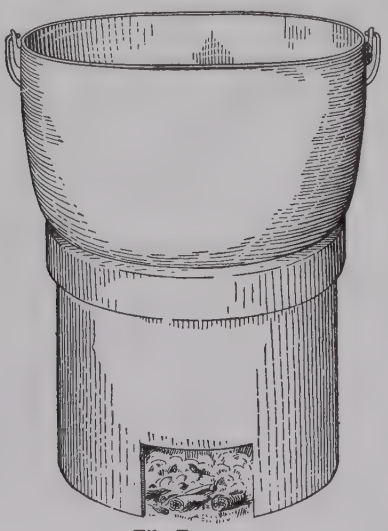
On some work it is quite difficult to locate the exact point for a dowel, but with the tool illustrated placed between the joint to be made and the parts gently pressed together you have the exact point for the dowel in each piece. The tool is made from a piece of sheet steel about ½ in. square with a pin having a point on both ends driven in the center, as shown in Fig. 1. The tool is placed between the pieces that are to be joined, as shown in Fig. 2. The small pin will mark the point for the bit in both pieces exactly opposite.—Contributed by Chester Purdy, Ghent, O.



Marking Bore Holes for Dowels

Outdoor Fireplace for a Kettle

When a kettle is used in the open air for heating water, or boiling maple syrup, there is considerable of the heat



Tile Furnace

wasted, unless a furnace of some kind is built about the fire. The accompanying sketch illustrates a furnace made of an ordinary drain or sewer tile. The diameter of the tile must be of such a size as to let the largest part of the rounding bottom set inside. Dig out a hole in the earth under the tile or break a piece out of the tile to make an opening to feed the fire and for the draft.—Contributed by Oscar Seegmiller, Walkerton, Can.

A Quick Repair for a Broken Steering Gear Rod

[Condensed from American Marine Engineer]

One of the large list of accidents which can occur on board a vessel and which has to be repaired with as little

Hooks Made on the Rod

loss of time as possible, and with the means available on board ship, is the fracture of one of the rods of iron connected by chains to the steering gear and rudder head. These are liable to break off if the boat happens to be caught by a heavy sea, owing to the immense strain which is put upon the surfaces of the rudder and transmitted through the link work to the steering gear, which at the moment of impact can be considered as a rigid point of fixture for the link work. A very simple way to repair such a breakdown is as follows:

The broken rod should be taken out and the ends of the broken parts heated in the boiler fire; they can then be easily bent into a hook shape, as shown in the sketch. The rod will now be short of its proper length by anything from 8 in. to 12 in., and this gap must be filled in either with a few links of chain or shackles or else by another piece of rod whose ends are bent as shown in the sketch, to fit in the hooks formed in the steering rod. In the latter case, the ends of the rod will have to be hammered over in order to prevent these pieces from falling out when the chain is slack. This form of repair is recommended inasmuch as it does away with welding, and not only does it form a quicker job but as a rule sufficient heat cannot be obtained at the moment to make a good weld, and the trouble might very easily be repeated when it is least desired.

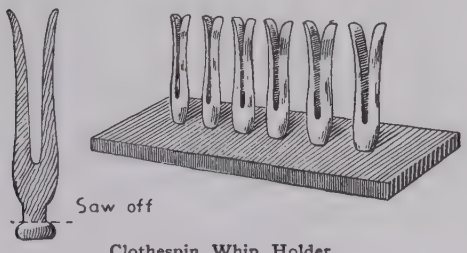
How to Make Tortoise-Shell Japan Surface

Boil together ½ lb. umber and 1 gal. of good linseed oil until the mixture becomes very brown and thick, then strain through a coarse cloth, after which continue to boil until it becomes of the consistency of pitch, when the mixture is ready for use. Clean the surface to be japanned and lay vermilion mixed with shellac varnish or drying oil very thinly diluted in oil of turpentine. When the vermilion becomes dry, brush the surface over with the first prepared mixture thinned in oil

of turpentine and when it sets, put the article in a stove or japanning oven where a strong heat may be applied and continued for some time. Several days or a week will be better for the baking.—Contributed by A. E. Johnson, Frankfort, Ind.

Home-Made Carriage Whip Holder

Take a piece of board 3 in. wide and 12 in. long and bore several holes in it as large as a wooden clothespin at the place just below the knob; saw off the knobs and fill the holes with pins as shown in the illustration. Nail the board up in your carriage house and

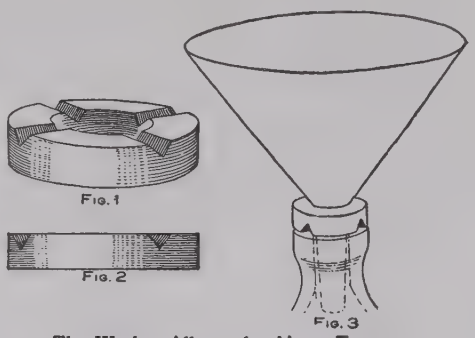


Clothespin Whip Holder

you will have a fine whip holder. If the pins are placed so they will touch each other, you cannot miss one when you make a strike to hang up the whip. —Contributed by R. H. Workman, Loudonville, Ohio.

Venting Washer for a Funnel

If the stem end of a funnel—especially those of glass—fits tightly in the necks of bottles it will not allow the air to escape freely while the liquid is running through, consequently the operation of pouring is rather slow. When filtering, the same trouble exists. The device shown in the accompanying sketch will remedy this fault. A section of a rubber garden hose or steam hose is cut so as to make grooves as shown in Figs. 1 and 2. Slip this rubber washer over the neck of the funnel with the grooved side next to the bottle, Fig. 3. This will elevate the funnel so as to form a free space between the stem of the funnel and the inside of the bottle neck to allow the escape of air through the grooves. This washer also prevents the funnel jam-

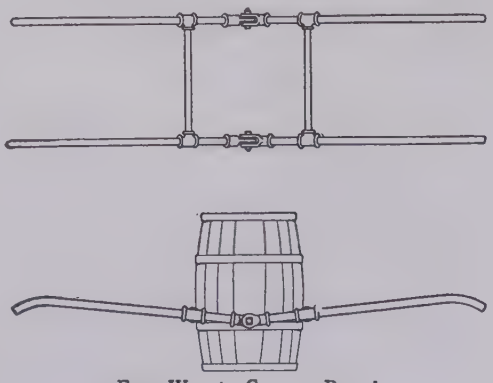


The Washer Allows the Air to Escape

ming into the neck of the bottle so tight that it is difficult to remove.—Contributed by James M. Kane, Doylestown, Pa.

Handles for Carrying a Barrel

A barrel when full is not an easy thing to handle even by two men. The shape of a barrel does not offer any part for a person to take hold and walk with ease. In order to provide a way to handle a large number of filled barrels in the easiest way possible I made a device as shown in the illustration, from pipe and fittings. The two hinge joints were made especially for this purpose. The handles are slipped over the barrel and then lifted by a person at each end. The lifting of the ends

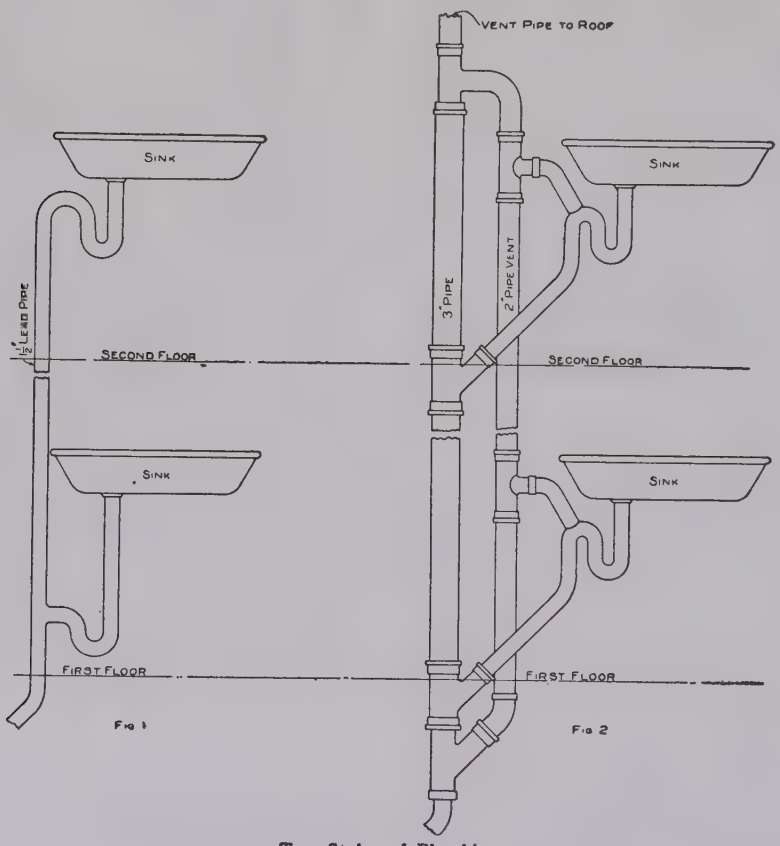


Easy Way to Carry a Barrel

will cause the hinged joints to bend, thus bringing the two cross bars together on the barrel.—Contributed by Oscar Lewis, Oshkosh, Wis.

Old and New Style Plumbing

There is possibly no branch of construction work which has undergone within the same given time such great changes of a far-reaching nature as plumbing construction. These changes look to the betterment of sanitary conditions and are going on all the time. This fact is illustrated in the accompanying sketch which shows a comparison between the methods employed several years ago and those of today. Figure 1 is a sketch of a job that was done twenty years ago, which never worked well and was always air-bound. The board of health ordered it changed and Fig. 2 shows the modern method of doing the same job. The vent and back-airing pipes are so arranged that sewer gas cannot enter the house.—Contributed by George M. Crawley, Jr., Newark, N. J.



Two Styles of Plumbing

Bonding New to Old Concrete

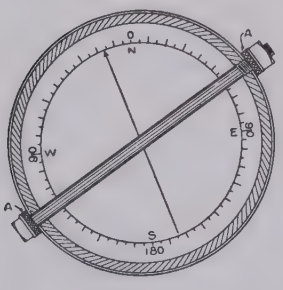
A description of how to make connections of new to old concrete after a lapse of 24 hours or more is given in a recent paper read before the American Society of Civil Engineers. The article states that the old surface concrete is broken back to firm material and the fresh surface cleaned with steam, air blast or forceful water streams, so as to remove all fine loose material. The surface should be well saturated, but not so much that the water will stand in places, or ooze from the material. This is painted completely with neat cement grout, mixed to the consistency of thin cream which must be put on just before the new concrete is deposited. Be sure that the new concrete is of the proper mixture, containing a proper proportion of mortar, which should be worked against

the joint so as to be certain that no voids exist in its vicinity.

When making connections after long intervals, so long that the old cement has set hard, and where the expense of rough pointing the whole surface is too great, use commercial muriatic acid, diluted with clear water, 1 to 5, or the commercial bonding powders, dissolved in clear water at the rate of 5 lb. of powder to 10 gal. water. Wet the old concrete surface with so much water that a fresh wetting is not immediately absorbed. Remove the excess moisture, and, when the surface appears as if commencing to dry, paint on the old surface three successive coats of acid one after the other. Allow this to remain about 30 minutes, after which carefully clean the surface of unspent acid, soluble salts, and fine material with plenty of water, finally cleaning with a steam jet or air blast, if obtainable. While the old material is very damp apply the neat cement and concrete as in the first case.

A Substitute Tool for Removing a Bezel Ring from a Transit

A bezel ring on a transit had become so badly corroded that it was too tight to unscrew by hand and as there was no tool for the purpose at hand the following method was used. A ¼-in. bolt ½ in. longer than the diameter of the bezel ring was secured, also two wrought-iron washers. Two sheet packing washers, A, were then put under the iron ones and the whole clamped on the bezel ring as shown in the accompanying sketch. By turning the ring, using the bolt as a handle, it was easily removed without injury to the surface or strain on the instrument. —Contributed by J. W. Wheeler, Cambria, Wyo.



Repairing a Split Tree

When a tree splits at the crotch, or shows a tendency to do so, it may be bolted together; but getting a bolt of the right length and putting it in neatly often involves considerable trouble, says the American Thresherman. A much neater, more effective, easier, and cheaper method is to use a stout wire, as shown in the accompanying sketch.

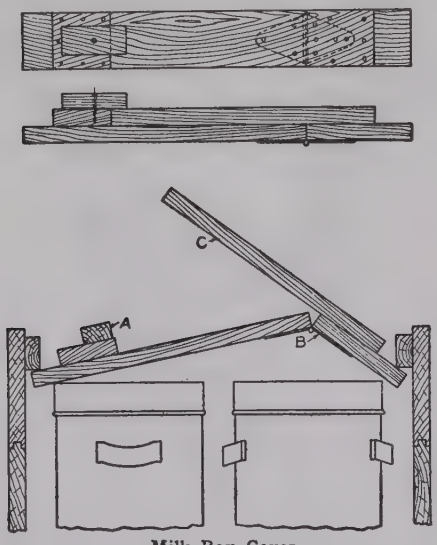
Limbs Tied with a Wire

One hole is bored through one branch of a tree, while two, close together, are made in the other. These should be small enough so that the wire will fit closely. The wire, cut amply long, is pushed half its length through the single hole. The ends are then put through the two holes in the other branch; and each is so bent as to come under the wire as shown. Any convenient bolt, strong stick or bit of iron bar is then used to twist the two strands together, thus drawing the two branches to the required position and holding them there. A year's growth is usually ample to cover all the wire except the connecting part. Of course the ends of the wire must be trimmed off as soon as they are secure.

Excessive sprinkling of the floor of a varnish room will cause trouble in varnishing.

How to Hold Milk Cans in a Cooling Box

The usual practice of small dairymen to keep their milk cool is to put the milk cans under running water in a box. The cans are usually kept beneath the water by slipping strips of board, of proper length, over the tops of the cans and under ledges at the side of the box. In using this method one runs the risk of upsetting the cans when putting the strips in position. An improvement over this method is shown in the accompanying sketch which is self-explanatory. The apparatus is made of strips of board, 1 in. thick. The lower sketch shows how the device is put into the milk box. B is a hinge and A is a button to lock the tongue C in place when the device is straightened out. Boards for holding grain in bins can be made in the same manner.—Contributed by H. G. W.



Milk Box Cover

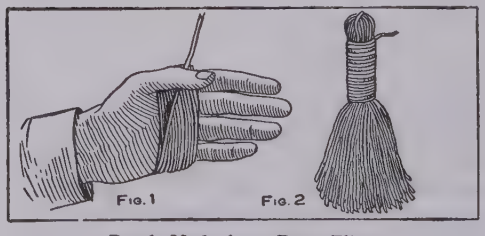
How to Straighten Dished Circular Saws

A number of 30-in. circular saws of No. 10 gauge stock in some way became dished or saucer shaped so much that the teeth were about 2 in. out of the plane of the center. The saws were placed one at a time on a perfectly flat surface with the concave side down and a heated circular piece of cast iron weighing about 4 lb. set on the center.

The center would draw down flat in a few minutes and then the iron was removed. One thing was noticed that when the heated iron was left on after the saw had drawn down flat, it would bow up or dish again on the opposite side and leave the concave on the upper side. This method may be applied in many cases; for instance, slender pieces which have warped in handling so as to seem entirely of no use may be quickly and accurately straightened by laying on a hot plate with a heated piece on top of them.—Contributed by Donald A. Hampson, Middletown, New York.

Home-Made Paint Brush

"Necessity is the mother of invention", so when I wanted a paint brush and could not find one at hand, I proceeded to make one and was surprised at the good results obtained. I wound some binder twine in a coil about my hand as shown in the sketch. After removing the coil from my hand I wound more twine tightly around one-half of the coil, thus forming a handle for the brush and leaving the other half for the brush part. I then cut the brush end off square and combed out all the loose ends and the brush was complete. This brush was excellent for rough work and did fine work with surprisingly good results. The length of the handle part and the length and breadth of the brush can be modified to suit the purpose for which it is intended.—Contributed by John A. Long, Walkerton, Can.

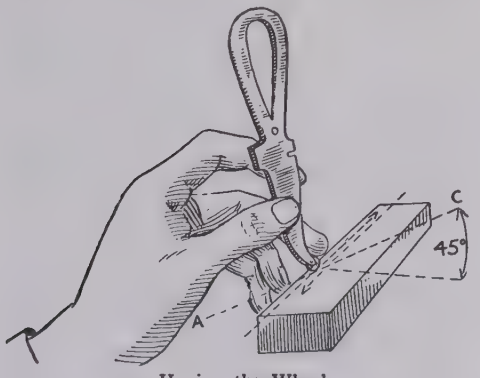


Brush Made from Rope Fiber

How to Cut Glass with a Steel Wheel Cutter

A cheap glass cutter with a cast-iron handle, and a small steel cutter will work nicely for the first one or two times, but the edge on the tool soon becomes dull and a good cut cannot be made. The wheel must be sharpened frequently in order to obtain good results. The sharpening may be easily accomplished in the following manner: Take the cutter in your hand and hold it against an oilstone. The little wheel should stand in the direction of the line AC. If the hand is now moved forward and backward along the edge of the stone, the wheel will rotate, thus honing the cutting edge. The wheel should be kept sharp for good results.

A glass plate should be cut on both sides with the cuts exactly opposite, before attempting to break the glass. Then start on one edge and tap lightly

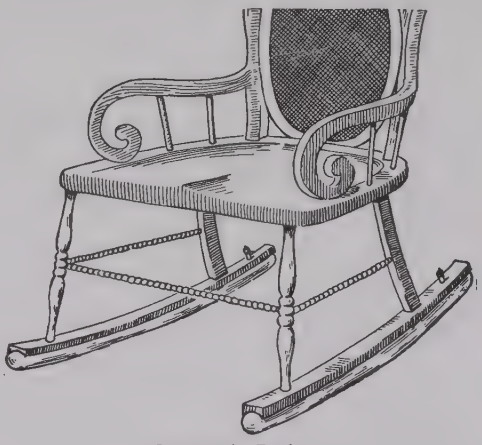


Honing the Wheel

along the cut until you see the glass break for a short distance and follow the whole line in this manner. The glass now can be easily separated without breaking it.—Contributed by Max Lange, Hartford, Conn.

A Pneumatic Rocker for Chairs

The bottom edges of both rockers are planed or chiseled out to fit the curvature of a pneumatic bicycle tire. A hole is bored in the rear end of each rocker for the valve stem. The front end of each rocker is fitted with a small bolt for holding the tire in place. If a single tube tire is used a length is cut out as long as the chair rocker and the ends stitched over and vulcanized so as to hold the air pressure.

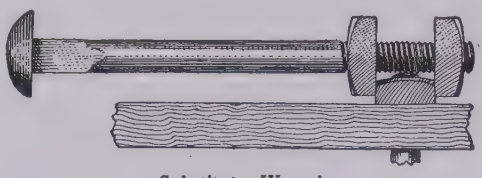


Pneumatic Rockers

A double-tube tire can be used in the same manner. The casing is cut and each end is made as a "dead end" in the vulcanizer. An inner tube can be put in and lapped over at each end. A short slit, cut on the inside of the casing near the ends, will provide a way to place the inner tube in quickly. The slits are laced up the same as a bicycle tire.—Contributed by W. S. Jacobs, Malden, Mass.

Substitute for a Wrench

If in need of a wrench and one is not at hand, take a large bolt and run on two nuts, allowing a space between them to fit over the nut to be turned. This will make a serviceable wrench, a

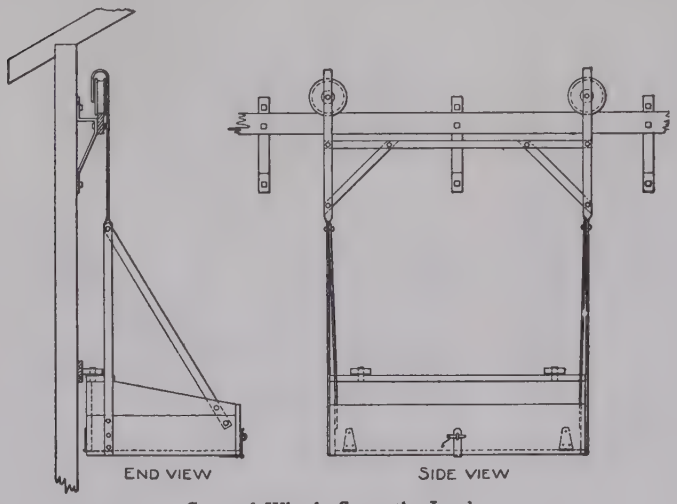


Substitute Wrench

substitute that will prove very beneficial in case of an emergency.—Contributed by Thos. L. Parker, Olaf, Iowa.

Keeping Light Castings Straight

Some methods used to keep light castings straight are barring the casting, cooling with water and clamping the casting fast. Some have tried ramming the sand over the casting on the part that warps. These methods have been found to be very fallible, as barring the casting often brings it higher than is wanted, using water cracks it, clamping will hardly hold at all, while ramming the sand hard does not serve any better for the reason that the sand dries, thus lessening its ability to hold the casting down, says the Obermayer Bulletin. In foundries where a suggestion is taken and tried they have found that the following method, if used properly and with judgment, will invariably give satisfaction.



Grooved Wheels Carry the Load

Lay a strip on the board with pattern of equal length and cast with the piece. Do not disturb the bed until thoroughly cooled. The aim of the strip is to be of sufficient weight to give all points of the casting equal heat, so that when it cools it will all cool equally.

If the casting is square, or nearly so, the cope sand can be left on and a groove or gutter scratched in it, diagonally from the corners, and these filled with iron. In this method omit the strip, as the iron over the top gives the center and sides the equal heat desired.

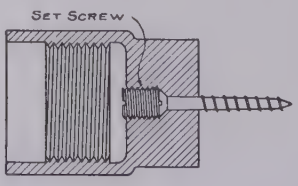
Manure Carrier for a Barn

The manure, damp straw and refuse from the stalls of cattle and horses are usually taken out of a barn in a wheelbarrow. Instead of using a wheelbarrow I made a carrier that has been in service for eight years and I find it a much better way to handle the material. The tracks I made from old wagon tire iron, the upper one being supported by brackets 2 or 3 in. out from the wall, and the lower one fastened directly to the studs. Two grooved wheels at the top, hung similar to barn door wheels, carry the weight of the load, while two flat-faced wheels, placed on vertical axles and running against the side of the lower track guide the lower part of the carrier. The box is made from 1-in. boards and the bottom attached with hinges and a catch so the contents can be emptied at will.

A chain or rope is fastened to the metal bars near the top which has sufficient length for a person to take hold and draw the carrier along the track.—Contributed by John Howard Miller, Thebes, Ill.

Improved Screw Chuck for Wood Turning Lathe

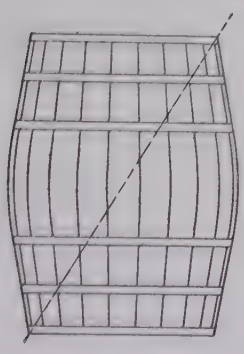
Wood-workers and pattern makers will be interested in this new scheme for holding the wood screw in a wood turning lathe chuck as shown in the accompanying sketch. The trouble with most chucks of this kind is that the wood screw is held in such a manner that it is almost impossible to remove it to replace with a



new one. In the one here shown a hole is drilled and countersunk for the wood screw, then it is tapped out and a set screw put in above the head of the wood screw to hold it in place, as shown. The set screw can be a piece of ordinary bolt sawed off to fit, and a slot cut in it with a saw so that it can be turned in or out with an ordinary screw driver.—W. W.

How to Determine a Half-Filled Barrel of Liquid

The accompanying illustration shows a simple way to find out when a barrel is half full of any liquid. Carefully tilt the barrel until the surface of the liquid is on a level with the dotted line shown in the sketch. If the liquid comes exactly to the line the barrel is half full.—Contributed by S. W. Halbert, Jr., Augusta, Wis.

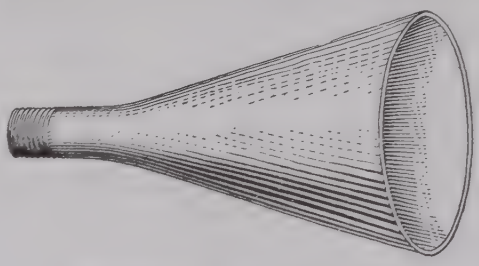


Under-Water Exhaust Heads for Motorboats

The law in several states requires the exhaust from motorboats to pass under water or have the engine equipped with an efficient muffler. This will decrease the power to some extent in either case, but the elimination of the noise adds much to the pleasure of motorboating.

The accompanying sketch shows an exhaust head connection for use under water, which not only does away with the noise, but actually increases the power. The expanding funnel provides a way to form a vacuum that will draw the escaping gases away from the exhaust valve, thus preventing any back pressure.

The funnel can be made from a casting by boring it out and threading the small end, or it can be made by riveting a sheet-metal funnel into a short length of pipe. In either case care should be taken to have the throat as



Funnel-Shaped Under-Water Exhaust

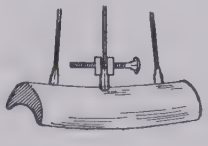
smooth as possible, and to avoid all sharp angles and turns as they cause loss in efficiency.

The exact dimensions of a funnel to give the best results in any one particular case can only be determined by experimenting, as they will vary with the type of boat and engine used. The exhaust pipe from the engine should lead out of the stern of the boat and should be at such a point that the funnel will be submerged at all times. The funnel should point dead astern, as in that position the rush of the water passing it causes the vacuum in the opening.

This under-water exhaust is similar to all other types in one respect, viz: the engine must be started with an open exhaust and the boat put well under way before turning the exhaust into the under-water pipes.—Contributed by Howard M. Nichols, Kenyon, Rhode Island.

Emergency Bicycle Nipple Wrench

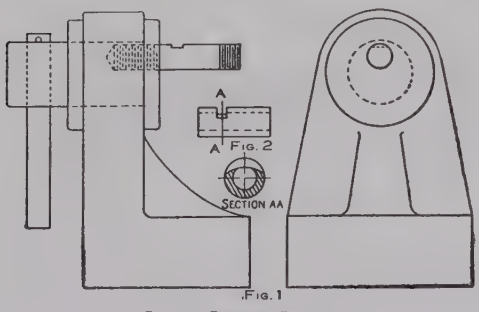
When you want to replace a few broken spokes in a bicycle wheel take a small bolt, a stove bolt will do, and run two nuts on the threads. Adjust the nuts so they will fit over the flattened part of the nipple, as shown in the sketch, and you can tighten the spokes as well as if you had a regular nipple wrench.—Contributed by Thos. DeLoof, Grand Rapids, Mich.



A Tool for Cutting Oil Ring Grooves

A very handy little device for cutting the oil ring grooves in the bearing bushings of small motors and engines is shown in Fig. 1.

The device consists of a stud, off-

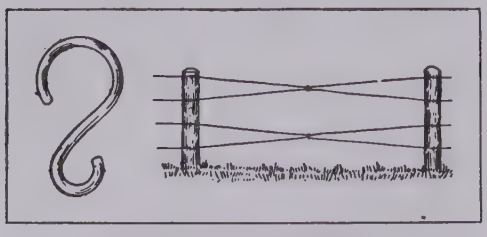


Cuts a Curved Groove

centered, and screwed to the circular body with the flange. The bearing, of bronze, is shown in Fig. 2. This is slid on over the stud and a nut screwed on to hold it solid. The whole is clamped on the bed of a hand milling machine. A circular saw cutter having a face width equal to the width of the cut required is fastened on the spindle of the machine. The small handle on the device is swung up until it is parallel with the milling machine bed. Then the bed is run up under the saw; the small handle is given a throw to the right and one to the left and a cut is made as shown in section AA.—Contributed by J. H. Crawford, Schenectady, N. Y.

Wire Fence Hook for Hunters

When a person goes hunting he must occasionally climb or crawl through a

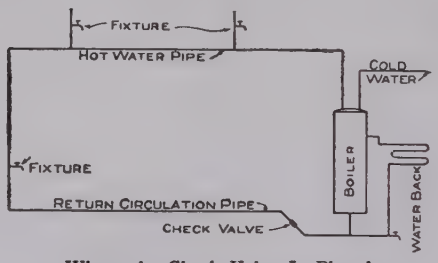


Hooking the Wires Together

wire fence at the risk of tearing his clothes. The little device illustrated in the enlarged portion of the sketch is a hook made from a heavy piece of wire similar in shape to a letter S. This is very simple, but practical when two of them are applied to the wires of a fence as shown in the other part of the sketch. —Contributed by Frank Evans, Detroit, Mich.

Preventing Back Circulation in Water Pipes

In buildings where the hot water pipes are returned to the bottom of the boiler to form a circulation system, it sometimes happens that fixtures located at the end of a hot water run will draw their supply through this return pipe, thus securing a supply of cold or lukewarm water instead of hot water.



Where the Check Valve Is Placed

A good method to prevent this is to place a horizontal check valve in the return pipe close to the boiler and inclined at an angle of 45 deg. from the horizontal, as shown in the accompanying sketch. This will secure a positive action without retarding the return flow of the water to the boiler. —Contributed by Geo. R. Evans, Berkeley, Cal.

Shears for Cutting Rubber or Sheeting

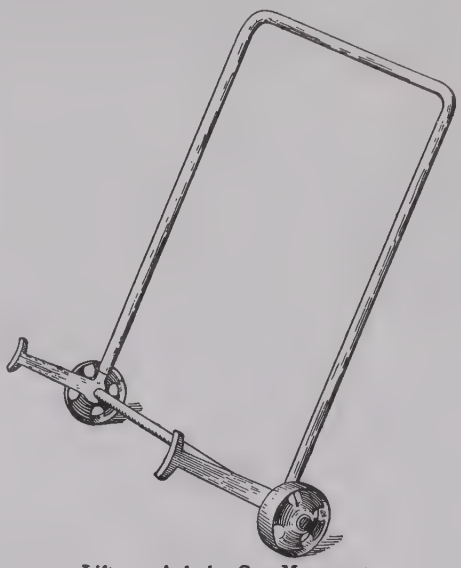
According to a correspondent of the Scientific American, a very handy tool can be made from an old pair of scissors or shears by cutting one blade with a set of saw teeth inclined toward the handle. These teeth hold the material fast, and prevent it slipping toward the point of the shears. Rubber sheeting, strips and all kinds of soft packing can be easily cut with square or inclined ends.

How to Remove Glass Stoppers from Bottles

Glass stoppers which are stuck in bottles may be quickly removed by holding the bottle at a slant of about 45 deg. and applying a burning match to the neck of the bottle around where the stopper seems the tightest and turning the bottle while the match is burning so the glass will be heated evenly all around. This will cause the neck of the bottle to expand before the stopper does and when the flame has well burned out, drop the match and quickly give the stopper a little twist and it will come out readily.—Contributed by Jno. E. Cox, Halstead, Kansas.

A Garage Auto Jack

A simple and effective wagon or automobile jack is illustrated in the accompanying sketch. With this jack both front or rear wheels can be raised from the floor in less time than it takes to tell about it, says Motor Age. The jack can be easily and quickly applied without the necessity of the operator crouching down under the car. By simply placing the jaws against the axle and pressing the handle down to the ground the wheels are lifted and securely held up while repairs, adjustments or replacements are being made on the wheels, brakes or tires; all that is necessary to do to let the car down on the floor again is to raise the handle; either one of the wheels, or both, may be raised by engaging one or both of the jaws; the leverage obtained from the long handle makes its operation comparatively free from physical exertion; it is not apt to be carried away unintentionally or otherwise; nor is it liable to be misplaced. It has no moving parts other than the rollers; and the cost of its construction is little more than the price of a jack of the regular type. The long U-shaped handle is made from a single ¾-in. pipe, the open ends of which are slipped over one arm of each of the bell-cranks. The bell-cranks are wrought-iron forgings, and are firmly attached to the axle, which is supported by cast-iron rollers

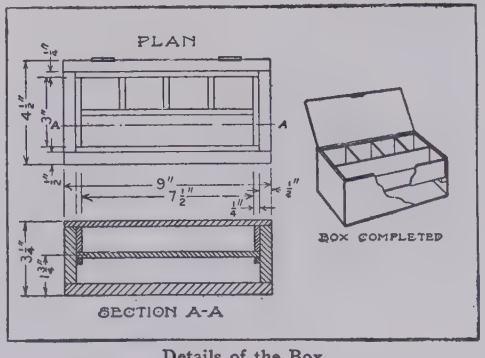


Lifts an Axle by One Movement

on either side. To prevent the jaws from scratching the paint, it is well to wrap them with rope, tape or cloth.

A Draftsman's Tool Box

A handy little case that provides a place for the instruments used by architects and draftsmen can be made along the lines of an ordinary mechanic's tool chest. The accompanying detailed drawing gives the dimensions to construct a proper sized box. As this is a

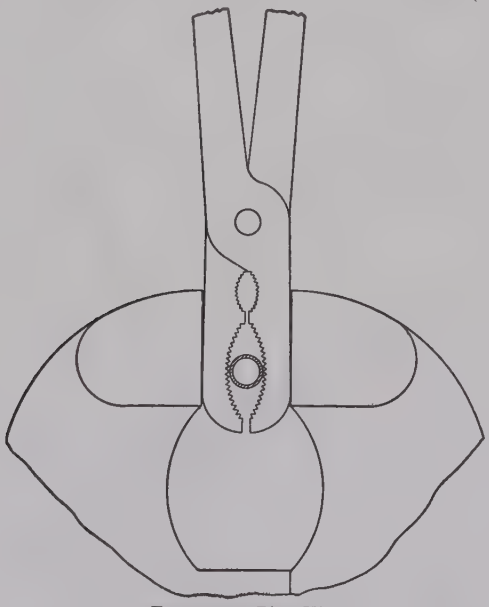


Details of the Box

small box, it can be made of the best material and highly finished.—Contributed by R. M. Dunkle, Chicago.

An Improvised Pipe Vise

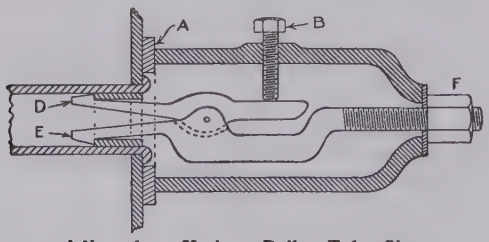
The writer had a job of pipe fitting to do some time ago where there was no pipe vise available. The accompanying sketch shows how one was made out of an ordinary pair of pipe pliers and a machinist's vise and it answered the purpose as well as the regular tool.—Contributed by M. J. Johnson, Appleton, Wis.



Emergency Pipe Vise

A Boiler Tube Ferrule Extractor

The boiler tube ferrule extractor illustrated herewith is being used in a number of shops, says the American Machinist. The tool has the advantage of being capable of some adjustment for use in various sizes of boiler tubes.



Adjusted to Various Boiler Tube Sizes

In using the ferrule extractor shown in the sketch, a hardened steel washer, A, is first placed against the tube plate, the setscrew B being slackened to allow the jaws DE to enter. When all are in position, the setscrew B is advanced far enough to press the jaws of the extractor tight against the sides of the boiler tube; the nut F is then turned with a wrench and the ferrule gradually drawn out.

Hints for the Amateur Automobile Repairman

Do not try to screw a nut down too tight, you are liable to strip the thread. In tightening the nuts which hold down the cylinders, or secure the bottom half of the crankcase to the upper half, or in any case where several nuts and studs are employed, be sure that a good firm contact is obtained between the surfaces to be drawn together before the nuts are drawn up. The nuts should be drawn up evenly all around, says Motor Age. Don't draw one nut down tight, then proceed to the next one, for if you do, the chances are that you will break off a lug. When packing is used, paste it to one half—the stationary part preferred—using shellac when the connection must be oil-tight and white lead where a watertight union is desired. A fold in the packing when the parts are drawn up tight will be the cause of a broken case or cylinder, or at least a leaky joint. Don't use a pipe wrench or a pair of pliers to tighten a nut if a plain jaw wrench is at hand, and avoid the use of a wrench whose jaws are too large to fit the nut. In making a gasket for a flange on the water, or gas piping, be sure to cut out the hole in the middle; blind gaskets are very detrimental to the successful operation of a motor. Whatever you do go easy, and try to make up your mind why and how you are going to do it.

When the safety valve blows off, compare it with the steam gauge. If they do not agree, find out which is incorrect.

SHOP NOTES

Heating Water for Cement

Having a quantity of cement left over from building a new house I concluded to build a creamery with it, and, as I had tried the old plan of heating irons in the fire and using them to heat the cement without much success, I devised the plan of heating the water in a coil attached to a barrel. This proved very satisfactory as the temperature was below zero and the water had to be heated for the concrete. I set two barrels about 6 ft. apart, one elevated about 3 ft. above the other, and then bent three coils in a 16-ft. piece of ¾-in. pipe, putting one end in each barrel. This left the pipe on a slant between the barrels. A fire was built under the coil and cold water was poured into the elevated barrel. As the water ran through the coil it was heated and passed into the lower barrel hot and ready for use.

Two Methods of Heating Water in Barrels

Two other methods may be used as shown in the accompanying sketch. The first one shown is two barrels on the same level, connected with a pipe and having a coil in the center attached to the bottoms of the barrels. A straight pipe is put in about one-third the way down from the top of the barrels. Water can be put in both barrels to a level just above the top pipe and the circulation will be free enough to heat the water quickly. The other method is to attach a pipe coil to one barrel as shown. This will cause a circulation free enough to heat the water rapidly.—Contributed by E. L. Jones, Nelson, Ill.

Tapping a Pressure Main

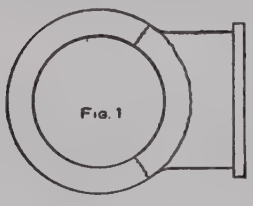
Tapping a water main while the pressure is on usually results in the workman getting wet. This wetting can be avoided if the simple device herein described is used.

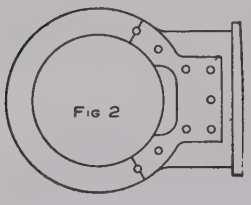
Secure an empty lard pail and nail a block of wood to the bottom on the inside. Run the drill through this clear up to the shank, and cut the pail to such a length that the drill projects about ½ in. below the open end. When the hole is drilled, the outrushing water will strike this pail and be deflected from the operator of the drill. —Contributed by Edwin S. Culver, Oakland, Cal.

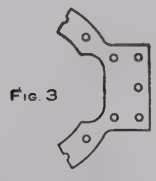
A marble slab is much better for a paint stone than a board, as it can be readily cleaned off.

Repairing a Broken Cylinder

The wrist pin on a 75-hp. steam engine broke, which allowed the piston to smash through the cylinder head, breaking it, also carrying away the steam port as shown by Fig. 1 in the accompanying sketch. A patch was made to fit the broken part in the following manner: The ragged edges were squared up so that a new piece could be fitted on as shown in Fig. 2. A brass patch could not be secured at the foundry as it was too large to cast in one piece, so an iron casting had to be used. As this could not be made steam-tight at the joints, allowance was made for a ¼-in. boiler plate to be put in back of it. The plate was cut as shown in Fig. 3. Studs were put in as shown, the ones at the joints to make them steam-tight. After the casting and plate were in place and secured, the plate was calked both inside and out. The new head of the cylinder was allowed to project so as to take in all of the studs. The patch never leaked and the engine was used until discarded.—Contributed by W. E. Heist, Saskatoon, Canada.







A New Rabbit Trap

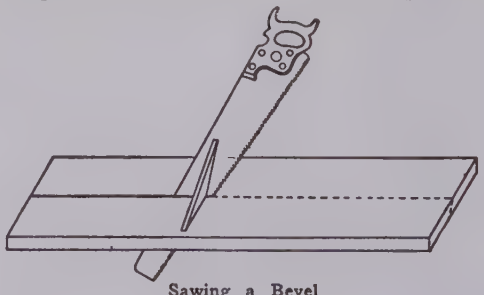
In a recent issue of Popular Mechanics I read a description of a rabbit trap. I have in mind a rabbit trap used by an overseer on a fruit farm of mine, which I think surpasses anything of the kind I ever saw. You must have a lively dog to help you out, however.

First, it requires a length of stovepipe inserted in a pile of brush or hedge. On the reverse end of the stovepipe there is a board ½ in. thick, put on a hinge so that when the rabbit enters one end, the board drops back by gravity, preventing the return of the rabbit. There is a gunny sack or something of the kind on the end of the stovepipe, where the door drops, to receive the rabbit. This can be substituted with anything available. Rabbits have been known to gnaw out of gunny sacks, but this can be easily prevented by substituting something else. This trap is very successful where there is a good dog. He scares the rabbits up and they start with a rush for the first hole in sight, which is the stovepipe. I have found as many as six or eight rabbits in a single trap.—Contributed by W. E. Clark, Kansas City, Mo.

How to Bevel Rip a Board

A long board is hard to rip perfectly true to bevel, but with the little device shown in the illustration the ripping may be made easy. The device is made of a block of wood cut to the required bevel, which is held against the saw as a guide to make an even slant or bevel for the full length of the board.

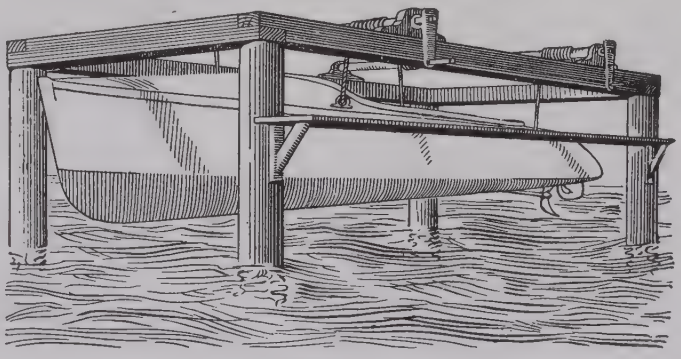
This block of wood will save lots of unnecessary work when a quantity of bevel ripping is wanted, says a correspondent of the American Carpenter and Builder, and comes in very handy for ripping saddle boards or hip boards for a roof. The edges may be run over a joiner and the bevel retained in perfect condition.



Sawing a Bevel

A Substitute Harbor

A sandy beach makes a poor harbor for a motorboat, especially if it faces an open stretch of sea. It is very difficult to beach any but the smallest launches, and the owner does not care to risk his craft at an unsheltered anchorage. The illustration shows how one owner makes sure that the surf will not destroy his boat. He drove four large piles at a place where the water had sufficient depth to float the boat, cut the tops off level and spiked a frame on top of them. Two winches were attached to the frame. The motorboat is raised by means of the winches sufficiently to clear the combers.—Contributed by J. J. O'Brien, Buffalo, N. Y.



The Boat Is Raised Out of the Water

Vacuum Relieved on an Under-Water Exhaust Pipe

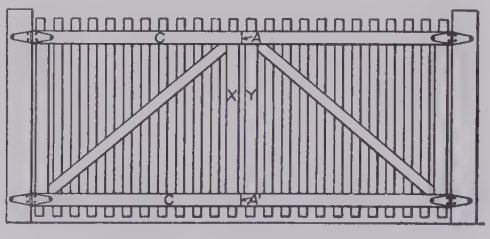
One of the worst troubles the owner of a motorboat with an under-water exhaust has is that of getting water in the cylinders of his engine. I have cranked for over an hour just to get out a little water which rendered the whole engine useless while it was in there. I have since discovered a way out of the difficulty, however, which may easily be applied to any boat.

The cause of the water getting in the cylinders is that when an engine is stopped and left for any length of time, the air in the cylinders and exhaust valve casings cools and contracts. As it contracts it naturally creates a vacuum which is filled by water running into the valve casings, and, if the valves are open or not well-fitted, into the cylinders as well.

The remedy for this is to place a small pet cock in the exhaust pipe at its highest point, and to leave it open after stopping the engine. Then instead of drawing in water, the cooling cylinder will take in air which is much better for the engine's well-being, and its owner's temper the next time he tries to run it.—Contributed by Harold H. Cutler, Springfield, Mass.

How to Hang a Double Gate

A simple and easy method of constructing and hanging a double gate so that it will swing perfectly true when complete is shown in the accompanying sketch. Make the gate in one piece by running the crosspieces C from one post to the other. Leave a small space between the upright pieces X and Y so that they will swing free of each other when the gate is cut in two. Hinge the gate to the posts at all four corners, testing the crosspieces with a level. Then saw the gate in two at A and A′ and the two halves will swing perfectly true and match each other.—Contributed by Walter E. Wright, Granville, Ohio.



Gate Ready to Be Sawed in Two

Use an old knife in cutting sandpaper; not the putty knife.

Spring Fork for Bicycles

The vibration on the handle bars of a bicycle, caused by running over

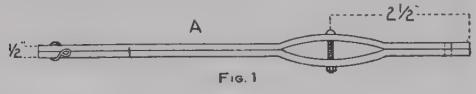


Fig. 1

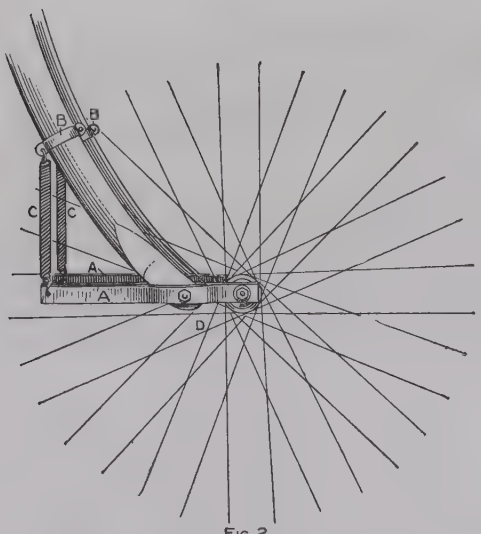


Fig. 2

Springs Attached to the Front Fork

rough roads, may be eliminated by attaching a spring fork. Such a contrivance that requires no special skill to make is shown in the accompanying sketch. Two strips of iron, A, Fig. 1, are welded or riveted together, leaving an open space 2½ in. from one end which is to receive the end of the bicycle fork and bolt. Two of these pieces are required, one for each side of the wheels. They are attached to the wheel and forks as shown at AA, Fig. 2, and connected with springs, CC, to clamps, BB, on the bicycle forks. The method of working is apparent.—Contributed by Donald H. Fairchild, Pana, Ill.

Fumigating a Greenhouse

The best way to get action on the insects in a greenhouse is to put the fumigating apparatus up in the ridge of the house and let the fumes fall, says a correspondent of Florists' Review. With the source of the fumigant placed on the walks, the vapor rising often leaves the lower part of the greenhouse only lightly fumigated, if at all. If the fumigator is hung close to the ridge the fumes given off are quickly cooled by contact with the glass and thereby become heavier than the atmosphere. This results in the fumes settling just as one sees a fog settle upon the ground. In this way the house will be filled evenly full of vapor clear down to the ground, completely enveloping the benches and the plants on them.

A fumigator can be made as a wire net in the shape of a cylinder. This is packed full of wet tobacco stems and hung up close to the ridge and the stems set afire at the bottom. The result is that instead of giving off smoke, the fumigator gives off steam. The only point necessary to watch is to see that the tobacco stems are properly moistened.

Supports for the Care of Paint Brushes

Common wood clothespins may be used as supports for holding paint brushes in a liquid while they are not in use. The pins are clamped on the brush handles and then placed on two sticks across the top of the pot as shown in Fig. 1. This method of supporting them in the liquid is especially good for camel's hair or any other brush made of fine hair. The brushes will become very much deformed if they are allowed to rest on the bottom

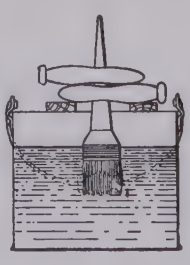


Fig. 1

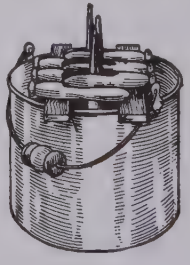


Fig. 2

Caring for the Paint Brush

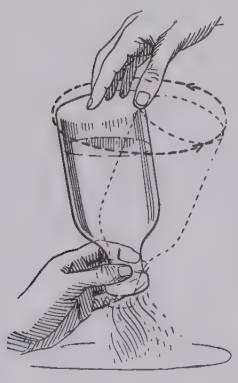
of the pot. Several brushes can be put in one pot, as shown in Fig. 2.—Contributed by James M. Kane, Doylestown, Pa.

Rosin as an Aid in Picking Fowls

All of those who have had the troublesome experience of picking wild ducks will find it quite easy the next time they have ducks to pick if powdered rosin is sprinkled among the feathers before placing the bird in the hot water. The heated water will run the rosin, and the feathers will all pull out like a solid mass. All the fine down will come out with the feathers. This method can be applied to tame fowls as well.—Contributed by C. Howell Dockson, Springfield, Ill.

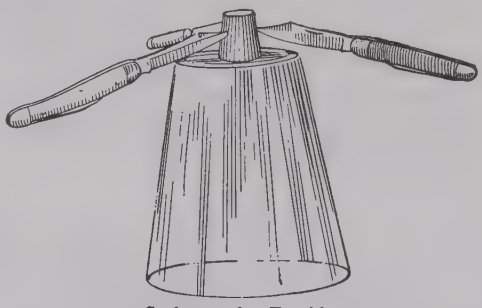
How to Empty a Large Bottle

A bottle, and especially a large one, can be quickly emptied if you take hold and invert it over the receptacle into which you wish to turn the contents, as shown in the sketch, and, while holding the neck in a steady position, give the bottom a rotary motion. This will form a small whirlpool that will admit air to the space vacated by the liquid and cause it to run freely from the bottle.—Contributed by Maurice Baudier, New Orleans, La.



Window Display for Cutlery

An attractive moving window display for cutlery and hardware dealers is shown in the accompanying sketch. The articles necessary are an electric fan, several old-fashioned glass tumblers and some corks. The tumblers are set upside down in the window so the current of air from the fan will strike forcibly against one side of them. Select for each tumbler three knives of about the same weight so they will balance well, open the longest blade of each and stick them into a cork at equal distances apart. Place the cork in the sunk portion of the glass as illustrated. The current of air striking on



Cork on the Tumbler

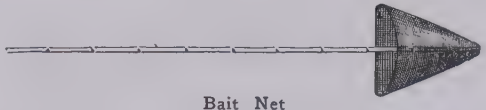
one side will cause the knives and cork to turn around. The fan should be placed in a corner where it can be concealed, or placed behind some larger object in the window display.—Contributed by Harry Miller, Lujane, Colo.

A Surf Bait Net

The simple device illustrated is the invention of an angler to aid him in securing sea clams and other marine creatures to be used as lures in catching Pacific coast fish.

The device consists of a cone of ¼-in. mesh wire firmly secured to the extremity of a stout bamboo pole, 12 ft. long. The lower portion, as shown in the cut, is flattened to form the horizontal plane when brought in contact with the sand.

The operator wades into the surf, extending the bait net through an incoming breaker to the sandy bottom, and drags it slowly toward himself as the wave recedes. Each successive haul discloses a number of sea clams which it would be almost impossible to capture without the aid of this device. The rigid pole permits placing

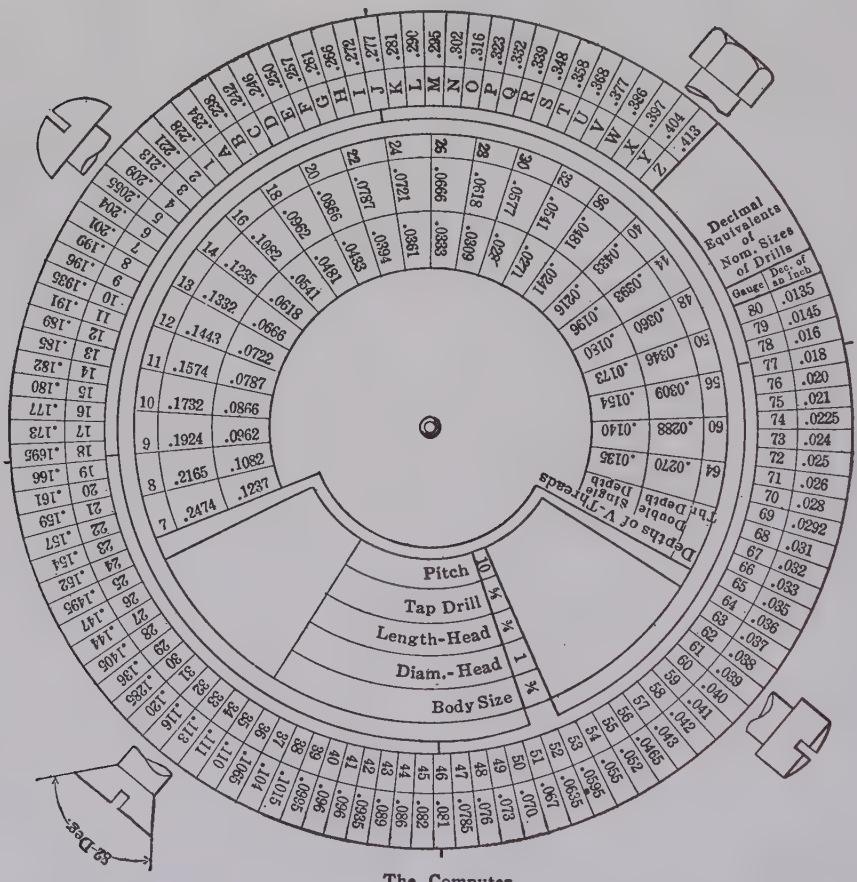


Bait Net

and holding the trap in any desired position, and serves as a lever to tilt the whole at any angle in scraping the wave-washed sands.—Contributed by H. M. Meinell, Sawtelle, Calif.

A Machine Screw Computer

Tables of machine screws are not convenient for frequent reference and a correspondent of American Machinist devised a computer as shown in the accompanying sketch for quickly finding the desired result. The computer was made by fastening blue prints on sheet metal.



The Computer

The outer circle gives decimal equivalents of nominal size of drills. The table on the center disk gives single and double depths of V-threads from 7 to 64 per inch. Under the center disk are five circles of figures giving the dimensions called for on the disk, opposite each circle. These give the sizes most used in machine-shop work and show only the size you want, preventing confusion of sizes.

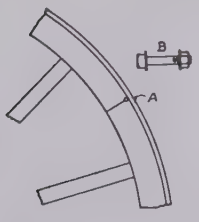
How to Construct a Road Through Swampy Land

A road almost one mile long through bottom land and swamps in the state of Illinois was graded up about 3 ft. above the level of the ground to receive a covering of stone. Before the stone arrived, high water covered the newly made roadbed and made it impossible to travel over the soft earth. Efforts were made to get the grade to specifications, but this was abandoned as the grade could not be kept in shape. The stone was hauled from the car and the building on the end of the road begun next to a railroad by unloading the stone in the center of the dump and not spreading any for the final course. The final course was dumped out in the mud for about 200 yd. and the road

builders dropped back and commenced with the second course, dumping it in the center as before. When the teams running over it did not fill the ruts, a man was employed to spread the stone and keep the ruts about level. The wheels of the wagons pressed out the sides of the embankment and made a protection of earth to keep the stone from spreading and rolling too far. By doing this the builders made most of the road about 8 ft. wide and 8 in. deep, except for about 150 ft. which was water and mud that could not be drained. On this part of the road boulders from 24 in. to as large as the men could handle were placed to make a firm foundation. Stone was placed on top of the boulders, which made a good road. A short distance was made up by placing stone in the mud and water, a yard in a place to cover 8 ft. wide and 10 ft. long; then covering the stone with sand and putting on more stone alternately several times, which cemented the stone and made a good road. The worst place was made by putting in 1 ft. of wheat straw and weighting it down with sand and stone put on the sand. This seems to be the best part of the constructed roadbed.

How to Fasten a Loose Wagon Tire

Tires often come loose in hot weather and if the wheels are so old or badly dished that it would not pay to have them reset, the following method to keep them on may be used to advantage. Drill small holes at the felloe joints and against the tire as shown at A in the sketch. Use an iron drill if you have one, as rubbing against the tire will not injure it. Put a bolt of proper size and length through the hole with washers on both sides of tire and fasten with a nut. This will hold the tire on the wheel and also make a solid joint if the felloes are loose.—Contributed by Allen L. Barnes, Harrisburg, Ill.



A Concrete Fountain

This unique fountain as shown in the illustration, is made of concrete formed over six small barrels and two box forms. While the concrete was still plastic, small stones were stuck in to give them the appearance of being laid in mortar. A small pipe connected to two faucets, one at each end of the top barrel, supplies the fountain with water. The basin resting on the first four barrels is the right height for watering horses and the overflow runs into the second or smaller basin at the bottom where dogs or other small animals may drink. The water overflows from the second basin through pipes into the nearby sewer.—Contributed by Frank H. Miller, Woronoco, Mass.

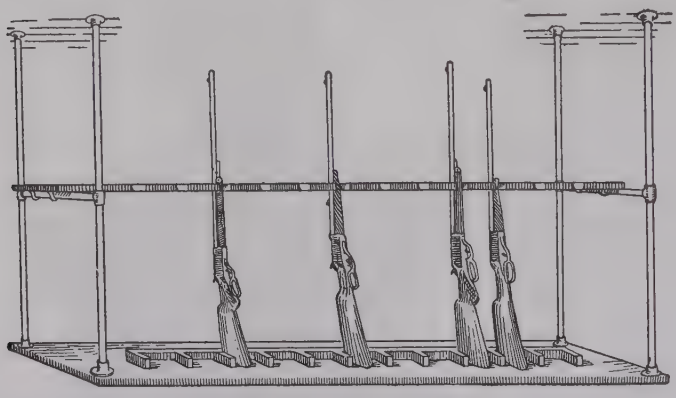
Unique Form of a Concrete Fountain

How to Restore Hones

Hones made of natural or artificial stone soon loose their original cutting properties on account of metallic particles filling up the pores. This can be remedied and the stone made to work as good as ever by carefully applying hydrochloric acid, which will convert the metal particles into chlorides. The chlorides are easily washed off with water.—Contributed by H. F. Jensen, San Francisco, Calif.

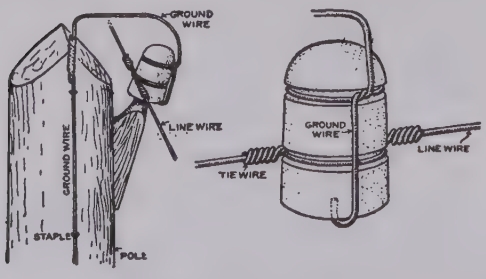
An Insulator Lightning Discharge Gap

We use a device such as is shown in the accompanying diagram to relieve our lines of lightning charges, says a correspondent of Telephony. The only material required is a piece of No. 12 iron wire and a double-groove porcelain insulator.



Gun Rack Fastened to Ceiling

Bend the piece of iron wire so as to make a hook about ½-in. deep with which to clasp the bottom of the insulator. The line wire is placed in the lower groove and tied in the regular way. The wire carrying the hook is then set in place on the rim of the insulator, properly bent, tied in the upper groove, and connected to a ground wire. Between this and the tie wire there will be a small gap, the width of which can be regulated by the lineman.



Method of Tying the Wire

This will provide an escape to the ground for lightning. The hooked wire must be drawn tightly around the groove so that it cannot move, and ground the line.

A Display Gun Rack

Most gun racks in retail stores are placed against the wall, but sometimes every available space is needed and a rack suspended from the ceiling, as shown in the accompanying illustration, will be found of value. The guns can be seen from either side and are within easy reach.

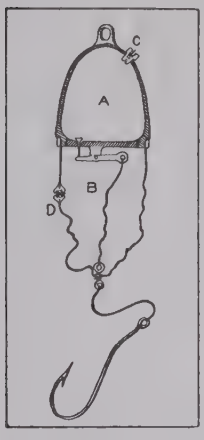
The rack is made of ½-in. iron pipe, which is cut in lengths suitable for the height of the ceiling. The upper lengths of the pipe are screwed into floor plates attached to a joist in the ceiling with screws turned through the plastering. These pipes are fitted with tees and a cross pipe. Four other lengths of pipe are turned into the bottom opening of the tees and their lower ends fitted with floor plates fastened with screws to a bottom board or shelf. Small stalls or divisions are nailed to the board in which to place the gun stocks. A narrow notched board is fastened with clips to the cross pipes for supporting the gun barrels.

Keeping Dry While Making a Joint Under Pressure

A plumber sometimes finds it necessary to start a pipe in a fitting from which water is flowing under pressure. This is an unpleasant task and the person attempting to do this will undoubtedly get wet. The water may be diverted by attaching a stop-cock to a long nipple and on this a pair of ells to form a reverse bend. Leaving the cock open while starting the thread removes practically all pressure from the branch and the reverse bend throws the water away from the workman while he runs up the thread by hand, after which the cock can be closed, and the work completed in the usual manner.—Contributed by E. S. Culver, Oakland, Cal.

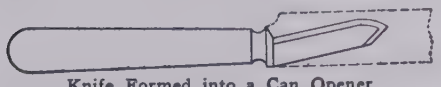
Raising a Fish Line Sinker with Compressed Air

The sinker is constructed with two compartments, viz.: a pressure cylinder, A, with walls thick enough to carry a high pressure of air and a collapsible bag, B, to receive a part of the air pressure to increase the displacement when the fish is hooked. The pressure cylinder has an air valve, C, for filling and a lift valve in the wall between the two compartments. The fish when hooked operates the lift valve by the pull on the line which allows the high pressure of air to pass through into the collapsible tube causing it to expand to its full size. The increased size of the bag produces sufficient displacement to draw itself, line and fish to the surface of the water. The sinker is to be used when fishing for perch or other small fish. The collapsible bag has a safety valve, D, to prevent excessive pressure.—Contributed by W. S. Jacobs, Malden, Mass.



Home-Made Can Opener

There are not many households that do not have one or two broken case knives. One of these will make a serviceable can opener if the part of the blade shown by the dotted lines in the sketch is filed away, and the top edge of the remaining metal sharpened for the full length as well as the lower edge on the end. This little tool will



Knife Formed into a Can Opener

be found very useful about the kitchen as it can be put to various other uses as well as that of opening cans.—Contributed by R. A. Bryan, Corsicana, Texas.

Home-Made Settee

Many people have old wooden beds stored away which can easily be made into handy settees like the one shown

Settee Made from an Old Bed

in the accompanying photograph. A few nails and one-half dozen 3-in. screws are all the materials necessary besides the old bed. The tools needed are a saw, hammer and a screwdriver. The headboard, if too high, can be cut off and some of the ornaments replaced. The footboard must be cut in two to make the ends or arms of the settee. The side rails and a few of the slats are used in making the seat.—Contributed by Wm. F. Hild, Lake Forest, Ill.

Red and Green Glass for the Moving Picture Machine Operator

The peep hole in the lamp house where moving picture machines are operated is covered with red glass. When the operator is watching his carbons and then occasionally looks at the pictures they will blur his eyes for the instant. Take a piece of green glass and place it in front of the red one and when the pictures are examined through both glasses no blurring will be noticed.—Contributed by Thomas Finn, Baltimore, Md.

Lighting a Fire Without Matches

The small nicks cut in the backs of Italian knives are for the purpose of

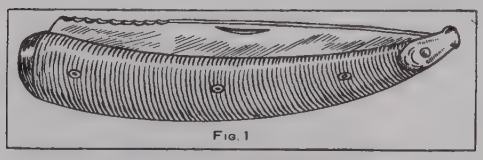


Fig. 1

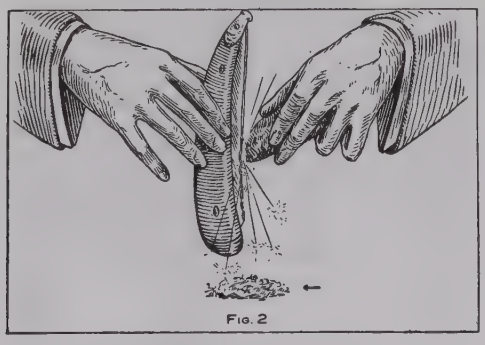


Fig. 2

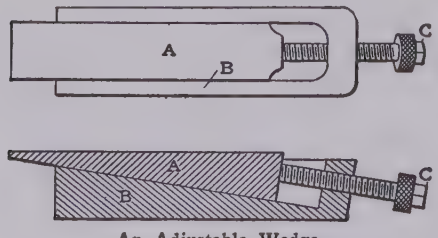
Lighting a Fire with Flint

making a fire when matches are not at hand. The notches are cut as shown in Fig. 1. The method of striking a fire is shown in Fig. 2.—Contributed by James M. Kane, Doylestown, Pa.

An Adjustable Wedge for Use on the Machine Table

The accompanying sketch shows an adjustable wedge which I use quite extensively in my shop in connection with milling, shaping, and planing machine tables, says a correspondent of the American Machinist.

The tool consists of a wedge, A, which slides in a hollow block, B, under the pressure of a screw, C, which

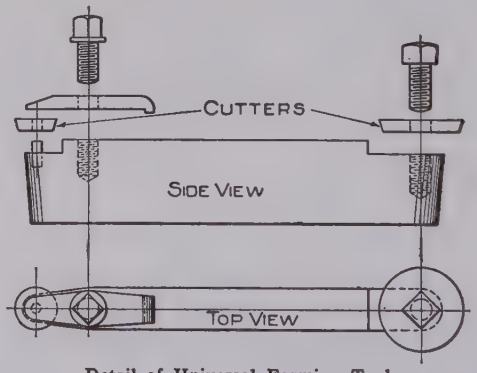


An Adjustable Wedge

has a portion of its head knurled for a finger grip, and the rest made square or hexagonal to fit a wrench. A number of wedges having different thicknesses can be used on the same blocks for obtaining a wider range. The tool has proved very useful, not only for setting pieces on the table of a machine, but also for clamping and holding irregular shapes in vises.

Universal Forming Tool

A universal forming tool for the lathe or shaper is shown in the accompanying sketch. The cutters are made of tool steel and can be of various sizes as they are interchangeable. The sizes ranging from 3/16 to ½-in. should have a ⅛-in. hole drilled in them, while the larger ones should be drilled ¼-in. The cutting edges of the cutters should be ground at an angle of about 10 deg. The holder is made of a piece of ½ by 1-in. steel about 5 in. long. Cut and round the ends as shown in the sketch. Drill a tight fit hole for a ⅛-in. diameter pin in one end and tap a ¼-in. hole in the other. The small cutters are fastened by means of a clamp and a



Detail of Universal Forming Tool

¼-in. cap screw. The large ones are also held by a ¼-in. cap screw. Not only round tools, but straight and irregular ones can be used.—Contributed by Max Lange, Hartford, Conn.

Repairing a Water Main Break

A 12-in. gravity supply main sprung a leak at a point where the line passed through a swamp. The crack was about 4 ft. long, not straight, but running spirally from one end to the other of the pipe. The crack would

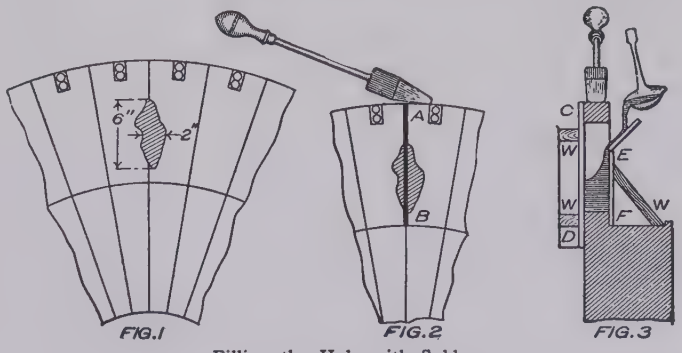
remain closed almost tight, but whenever high pressure occurred would open to about ¾ in. The pipe was buried about 3 ft. in quicksand. After digging down to the pipe it was decided that it could not be replaced without sheeting the excavation, and the following method for closing the break was used: Heavy iron screw bands ⅝ in. thick, ⅜ in. wide and having 1-in. thick jaws clamped with ¼-in. screw bolts were placed around the pipe at equal intervals over the break. After setting all bands tight, a strip of gum rubber was fitted tightly over the crack with strips of wood and wedges between the jaws under the bolts. No doubt the crack will be rusted tight by the time the rubber has decayed.

While the foregoing plan is a good one, the safest and surest way would be to make a box form around the pipe, and, after clamping the pipe and stopping the leak, fill the form with a neat mixture of concrete, using some kind of metal reinforcement.

Repairing a Damaged Commutator

A method of repairing a large hole which was burned in two adjacent bars of a commutator, the intervening mica being pierced and destroyed by the arc set up, is from a description given in Feilden's Magazine.

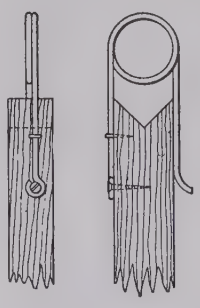
Figure 1 shows the general shape and dimensions of the hole. The first operation was to clean carefully and tin the surface of the hole. The two bars were then wedged apart and mica strips, A B, of the requisite size and thickness forced in. The commutator was then warmed up as much as possible by means of soldering irons and strips of mica, C D, E F, placed at the front and back of the hole, being kept in position by pieces of wood, W. Solder was then poured into the hole from a ladle, using a rough mica funnel to guide it. This method proved to be a thoroughly good mechanical and electrical one, and saved the time and cost of dismantling the commutator entirely and fitting new bars. The details of the operation are shown by Figs. 2 and 3.



Filling the Hole with Solder

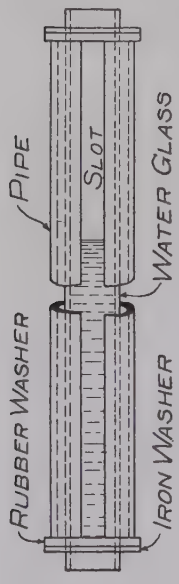
A Clip for a Clothesline Pole

Often, in windy weather when clothes are hung on a line to dry, the wind swings the line to and fro, causing the props to drop from under it and letting the clothes drag on the ground. A simple and effective means of preventing this mishap is shown in the accompanying sketch. A piece of steel wire of 12 or 14 gauge is formed around a stick or pipe, leaving the ends in the shape shown. The clip is fastened to the pole by means of a wood screw through the eye at one end of the wire. A small staple should be driven over the wire near the end of the pole to prevent the clip turning on the screw. To put the prop under the line, the hook end of the wire is drawn over the line until the hook opens sufficiently to allow the line to pass under it, where it stays until released.—Contributed by O. E. Miller, Philadelphia, Pa.



Protector for a Water Gauge Glass

Water gauge glasses on boilers often break from one cause or another, and it is a very difficult task to close the stop cocks without getting scalded from the escaping steam and hot water. The accompanying sketch shows how a contrivance can be made in a few minutes' time which will protect the glass from getting broken, and if broken, will keep the person in charge from being burned when he closes the steam and water cocks.



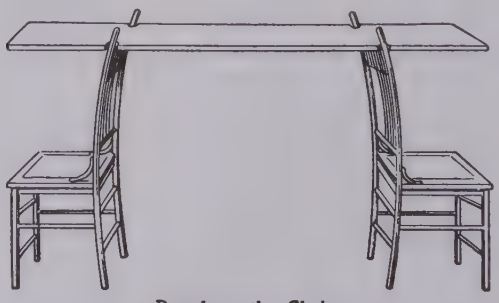
When putting in a new glass slip over it two rubber washers, and on the outer side of these, two iron washers. Insert glass in the usual manner, then push the iron washers, one each way, and the rubber washers tight against them. Now get the distance between the two rubber washers and cut a ¾-in. iron or brass pipe, the same length as the distance between these rubber washers. Slot this pipe from end to end, pry it open and slip it over the glass between the two rubber washers. Now close it with a pair of pincers, close up until you have a ¼ or ⅜-in. opening between the edges of the pipe. The water level can be seen through this slot, and if the glass breaks one can get behind it and close the cocks without being burned. Paint the pipe red on the inside and the water level will show up better in the glass.—Contributed by H. C. Faber, Monongah, W. Va.

How to Waterproof Canvas

The method used by the British navy yards for waterproofing and painting canvas so it will not become stiff and crack is as follows: One ounce of yellow soap and ½ pt. of hot water are mixed with every 7 lb. of paint you wish to use. The mixture is applied to the canvas with a brush. This is allowed to dry for two days and then a coat of the same paint without the soap is laid on. When this last coat is dry the canvas may be painted any color desired. After three days of drying the canvas may be folded up without sticking together, and, of course, it is waterproof. The canvas waterproofed in this manner makes an excellent covering for portable canoes and canvas boats. The color mixture for the soap and second application is made from 1 lb. of lampblack and 6 lb. of yellow ochre, both in oil; the finish coat may be any color you wish. When no paint is to be used on the canvas it may be waterproofed with a mixture made from soft soap dissolved in hot water, and a solution of iron sulphate added. Iron sulphate, or ferrous sulphate, is the green vitriol. The vitriol combines with the potash of the soap, and the iron oxide is precipitated with the fatty acid as insoluble iron soap. This precipitate is then washed, dried and mixed with linseed oil and applied to the canvas. This will render the cloth waterproof, and at the same time the material is quite flexible and not inclined to crack.

Ironing-Board Stand

When an ironing-board is placed upon the backs of chairs for convenience it will not stay in place as the



Board on the Chairs

clothes are ironed. If the board is notched, as shown in the illustration, to fit the back posts of each chair, both

the chairs and board will stand as solid as a table while the work is being pressed.—Contributed by Nathan Tornausky, Rockville, Conn.

How to Drill Odd-Sized Holes Smooth and True

Quite often a machinist has several small holes to drill of an odd size that should be smooth and exact. An ordinary drill will not make a smooth hole and invariably drills a larger hole than the drill size and because of the odd size a reamer cannot be used. A good way to do the job and get a smooth hole is to first drill through with a drill $\frac{1}{16}$ in. smaller than the size required, then take the regular size drill and round the corners of the cutting edges as shown in the accompanying sketch and finish the hole out with this. The drill acts as a rose reamer and the result will be a perfectly smooth hole of standard size.

A Plumber's Socket Wrench

A useful device that may be resorted to in case of necessity is a socket wrench made from wrought-iron pipe to fit over the square heads on plugs used to stop an outlet when a plumbing system is to be tested, or has been left for the connection of a fixture at some future time. A little oversight may leave these plugs in position where they cannot be turned with a common wrench after a plumbing system has been tested and the tiling has been set and the walls finished, says Metal Worker. To attempt their removal by means of a wrench in the ordinary way would mean a great deal of expensive work.

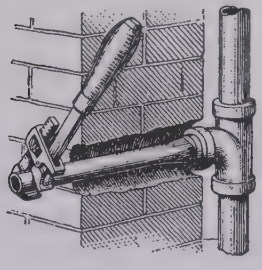


Fig. 2

Socket wrenches made as shown in the accompanying sketch, Fig. 1, provide a way to remove plugs left in

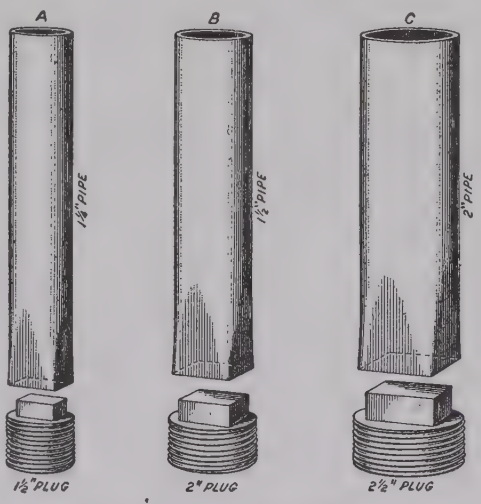


Fig. 1—Set of Socket Wrenches

places that cannot be reached with the ordinary wrench. Each socket wrench is made from a piece of wrought-iron pipe, heated in the forge and one end formed square with a hammer, so it will fit over the square head of a plug. The socket wrenches should be about 18 in. long.

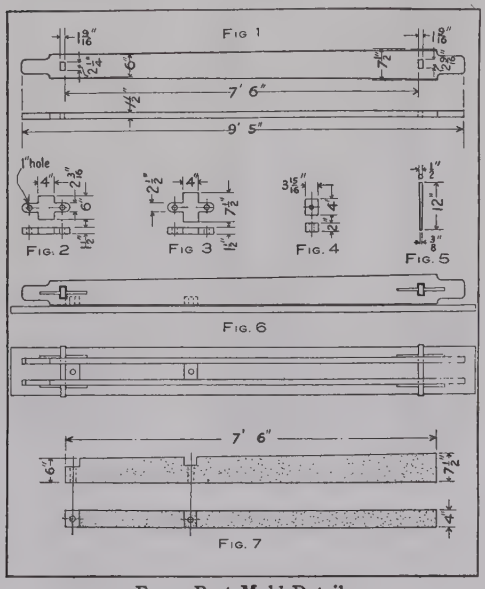
In making up such wrenches it will be found that 1¼-in. pipe is the best size to use for making a wrench for a 1½-in. plug, 1½-in. pipe for a 2-in. plug, and a 2-in. pipe for a 2½-in. plug. When these socket wrenches are used in connection with a pipe wrench, as shown in Fig. 2, the plugs of various sizes set in unhandy places may be easily removed.

Preventing Blueprints from Fading

Expose the print until it is somewhat "burned," remove from the frame and wash until all the emulsion is removed. Immediately after the washing spread the print or prints out on a smooth surface and paint the blue side over with peroxide of hydrogen. This will bring out the ground very blue and the lines perfectly white. Such a print will not fade in sunlight.

Mold for Making Concrete Fence Posts

The detail drawing gives the sizes to construct an ordinary post. The mold requires two sides as shown in



Fence Post Mold Details

Fig. 1, which are spaced with the end pieces, Figs. 2 and 3, and clamped with pins. Two blocks, Fig. 4, are fastened to the board forming the bottom of the mold, Fig. 6, to make the mortises for the rails. Two iron pins, Fig. 5, are placed upright in the blocks after the mold is set up. These pins should be removed before the cement sets.

As many bottom boards should be used as there are posts to be made. After tamping in the concrete and forming the post take out the pins and remove the four form pieces and set the bottom board with the green post aside to cure.—Contributed by Harry M. Wynn, Warwick, Pa.

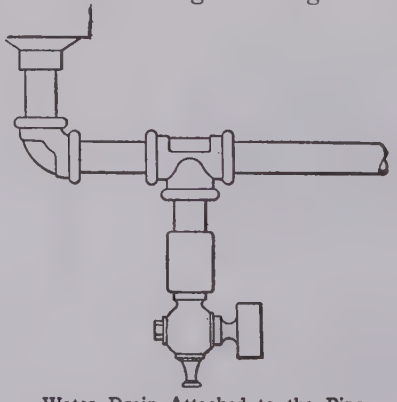
Preservation of a Leather Carriage Top

The hand-buffed leather top, so long as its enamel remains unimpaired, needs no dressing. An occasional washing of the leather with castile soap, or with an oil soap in which the oil counteracts the activity of the alkali, will serve to remove any injurious substances accumulated during service. Cleanliness will keep the top elastic so it will be responsive to the ordinary demands imposed upon it.

When the enamel has fractured and worn down close, and in many places worn away altogether, the leather needs something to both restore and preserve it. Cleanse off the leather first with castile soap and water. Dry off with a soft woolen cloth. Melt 2 oz. of beef suet in a scant pint of neatsfoot oil, after which darken with drop black. Take a piece of beeswax about the size of an ordinary thimble, melt, and add to the oil and suet; mix thoroughly and apply with a cotton cloth saturated with the material, rubbing it on smooth and uniform. Apply this mixture every 4 or 5 months.

Removing Water from Gasoline

The water from condensation or otherwise found in gasoline may be removed through a drain drip cock attached at the lower end of a vertical pipe connected in a horizontal supply pipe coming from the bottom of a tank when the oil is used in an ordinary gasoline engine. The water being heavier than the oil will collect in the bottom of the tank and run through the pipes first, causing considerable trouble in starting the engine. The



Water Drain Attached to the Pipe

supply pipe connected as shown in the illustration with the drip extension at the bottom provides a way for the collecting water to be drained off before reaching the engine cylinder.

A New Method of Planting Tomatoes

Instead of planting tomato seeds in a box as most people do, cut a hole in a small potato, fill with dirt and plant your seed in this. When you wish to transplant, set the potato just as it is into the ground. In this way you do not disturb the roots of the young plant and it is not set back by the transplanting.—Contributed by Vigne M. Carey, Grand Rapids, Wis.

Formula for Depth of Threads

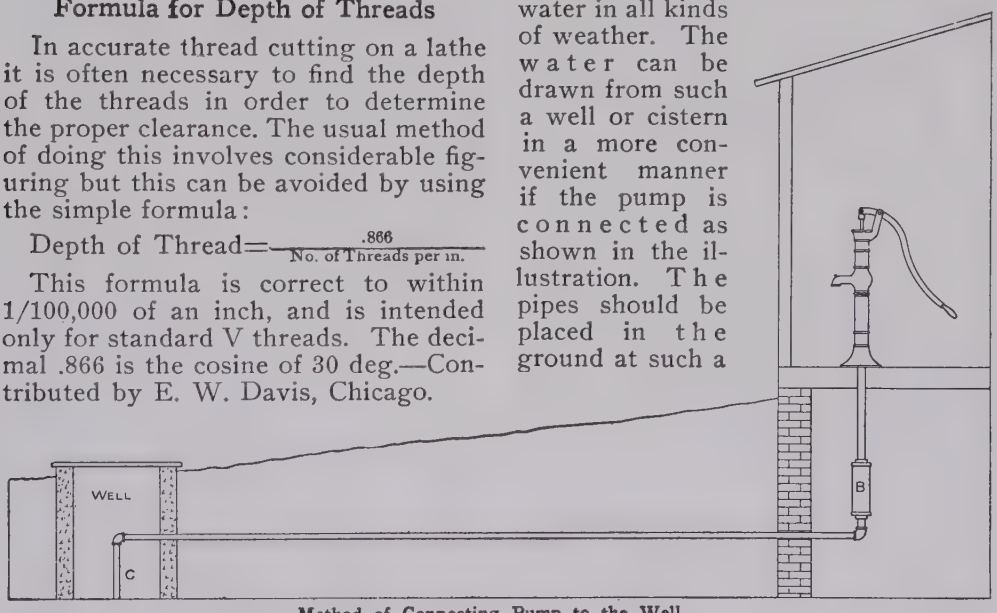
In accurate thread cutting on a lathe it is often necessary to find the depth of the threads in order to determine the proper clearance. The usual method of doing this involves considerable figuring but this can be avoided by using the simple formula:

$$\text{Depth of Thread} = \frac{.866}{\text{No. of Threads per in.}}$$

This formula is correct to within 1/100,000 of an inch, and is intended only for standard V threads. The decimal .866 is the cosine of 30 deg.—Contributed by E. W. Davis, Chicago.

A Lift Pump

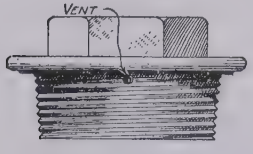
Many country homes have wells or cisterns located at some distance from the house, making it necessary to pump and carry the water in all kinds of weather. The water can be drawn from such a well or cistern in a more convenient manner if the pump is connected as shown in the illustration. The pipes should be placed in the ground at such a depth that they will not freeze in winter. The distance the pump is away from the well is immaterial as long as the water level is within 29 ft. 6 in. of the cylinder. Lay the horizontal pipe perfectly level and be careful to avoid all unnecessary crooks and turns. The pipe should be 1 in. in size on extra long runs. Place a foot valve on the lower end of suction pipe C, and the pump is ready for use. A pitcher pump can be used as shown in the sketch, if it is provided with an extension cylinder, B. This scheme will work satisfactorily, providing the water in the well is not below the limit of suction.—Contributed by R. F. Wahl, Morrisonville, Ill.



Method of Connecting Pump to the Well

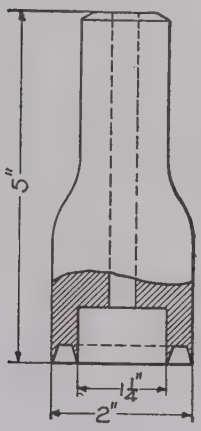
Venting the Air Pressure Plug on a Gasoline Tank

It is not uncommon to see people rush into a garage to obtain a supply of gasoline; then loosen up the plug on the gasoline tank a few turns and wait a couple of minutes for the pressure to leak out, says Motor Age. It is also annoying to have the plug fly out and either hit the driver in the face or roll under the car or some other undesirable place, when he does not wait till the pressure has leaked out. All such trouble may be easily eliminated by boring a hole about 1/8 in. in diameter at the top of the thread, as shown in the illustration, so that when the cap is loosened about two turns the air pressure can rapidly escape.



Paper Washer Cutter

A milling machine operator knows the value of paper washers in making fits between the cutters placed on a mandrel. As these washers are usually cut with a knife, making the work very tedious, I devised the tool illustrated to cut them rapidly. The tool can be made from machine steel and case-hardened, or tool steel hardened the same as any wood-cutting tools. The tool has two rings with cutting edges turned on the metal with a distance apart equal to the desired width of the washer ring. The paper is placed on a block of wood, the tool set on it the same as a punch, and a blow struck with a hammer. Washers up to 1-16 in. in thickness can be cut this way with one blow.—Contributed by W. F. Oliver, Plainfield, N. J.



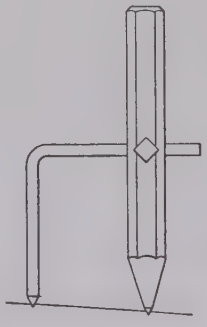
Structural Steel Lathe Frame

The accompanying sketch shows the design of a structural steel frame for a wood-worker's lathe which has been in use for some time and is found to give much better satisfaction than a wooden frame.

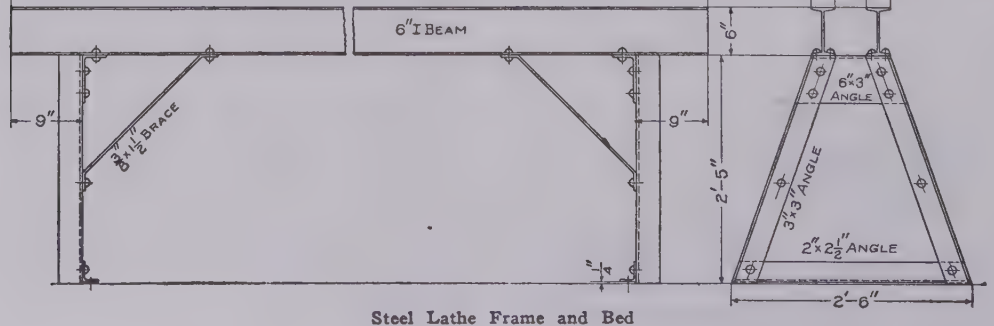
The bed is made of two 6-in. I-beams, 10 ft. long. A light cut should be taken off the inside of the top flanges, with a planer, so that the tail stock will slide easily. The legs are made of 3 by 3-in. angles and are connected at the top to the bed with 6 by 3-in. angles. The bottom brace angles are 2½ by 2 in. and are placed ¼ in. above the floor so that the legs will take all the bearing. There should be two holes in each of these angles for lag screws for bolting the frame to the floor. The legs are set back from the end of the bed 9 in., so as to provide plenty of room to work with the floor stand at the end of the lathe. Knee braces of ⅜ by 1½-in. bars should be put in to brace the frame lengthwise.—Contributed by M. E. Duggan, Kenosha, Wis.

Laying Out a Large Hole

When a large hole is to be drilled or bored the usual way of laying it out is to make a ring of center punch marks on a circular line, drawn with a compass, as a guide. I have found that the holes can be laid out much more quickly by the use of the tool shown in the accompanying sketch. The tool is made of steel rod, bent and pointed at one end as shown. The other end passes through the shank of the punch and is held in place by a setscrew or a wedge pin.



When in use, the tool is set at the

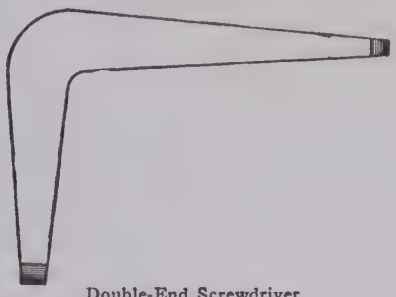


Steel Lathe Frame and Bed

desired radius and placed in the position illustrated, with the point of the rod in the punch mark at the center of the hole to be drilled. The tool should be so made that in this position it will stand somewhat out of vertical. The punch is then brought back to the vertical, the blow struck, the point of the rod dropped back to the original position, and the punch moved around to another point.—Contributed by C. W. Nieman, New York City.

A Strong Home-Made Screwdriver

The accompanying sketch shows a handy screwdriver that can be made out of an old file in a few minutes. First take the temper out of the file by heating it red hot and letting it cool slowly. Taper and grind each of the ends to a screwdriver point. One end



Double-End Screwdriver

can be made for large screws and the other for small. Heat the file in the fire at about the middle point, place it in a vise and bend it as shown in the sketch. Hammer the bend out flat and smooth all rough edges. The arm that is for the large screws should be the shortest. Screws can be loosened with this tool that the ordinary screwdriver will not start. It can also be used in combination with a monkey wrench which gives it an extra strong grip.—Contributed by J. W. Sorenson, Everett, Wash.

Slot Plugs for Milling Machine Beds

A great many milling machine beds are not equipped with oil pans, and consequently oil cannot be used on the cutters in any quantity without it getting all over the machines and on the floor. It is for these machines that the little device shown in the accompany-

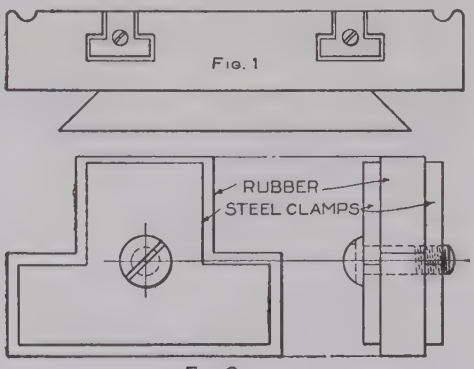
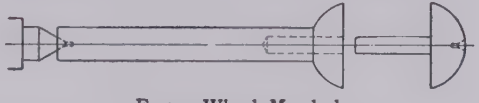


FIG. 2
The Stop Placed in the Grooves

ing sketch is intended. Cut two steel plates, making them about 1-16 in. smaller in size than the T-slot in the machine bed. Drill one plate and tap the other for a machine screw as shown in Fig. 2. Secure a piece of soft rubber, cut it so that it will easily fit in the T-slot, place it between the two plates, and the plug is complete. Insert the plug in the end of the T-slot and tighten the screw. This draws the plates together and expands the soft rubber between them, thus making an oil-tight joint. Figure 1 is a general view showing how the plugs are placed in a milling machine bed.—Contributed by H. D. Chapman, Washington, D. C.

Lathe Mandrel for Emery Wheels

It sometimes happens that one wishes to use a small carborundum or emery wheel in the lathe but has no mandrel to fit it. The accompanying

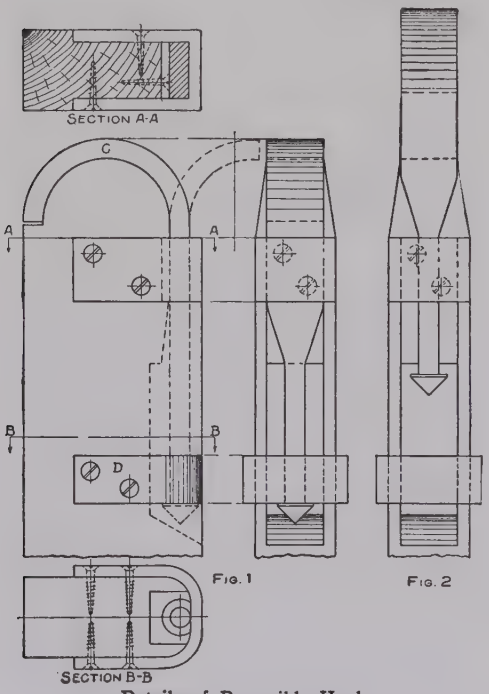


Emery Wheel Mandrel

sketch shows the design of a substitute that is very easy to make and is also adjustable to any size wheel. It can be quickly made in any machine shop and it will be found a very useful tool to have about.—Contributed by J. H. Norrell, Augusta, Ga.

A Reversible Hook for Machine Shop Ladders

A hook on the end of a machine shop ladder that is reversible or can be turned back out of the way when not



Details of Reversible Hook

in use is shown in the accompanying sketch. The idea is to have hooks for use on line shafting in the usual manner and at the same time have them so they can be turned back out of the way when it is desired to use the ladder for other purposes. In the sketch the hook C may be swung in or out by pressing on lower part of hook until it disengages from lock bar D and then raising C as in Fig. 2 until the round portion is high enough to let it swing around 180 deg. It is then pushed down again until it is locked as before. The lower portion of hook is round and also small enough to be somewhat flexible.—Contributed by W. E. Morey, Chicago.

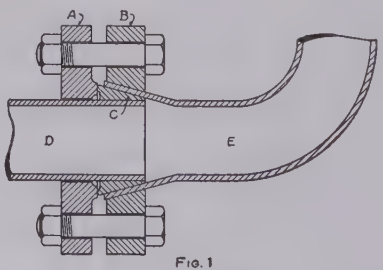
Do not think that any old paint is good enough for barn or other common work. The best is none too good.

A New Coupling for Copper Pipe

[Condensed from Marine Engineer, London]

Cases innumerable have demonstrated, and it is now very generally recognized, that strains arising from expansion and vibration in copper piping on board ship, especially in the case of lengths of piping having bends, are chiefly borne by the copper near the flanges of the coupling. This, conjoined to the other fact that it is just here where weakness in the piping exists as a rule, through the impaired strength due to brazing, has led to the introduction of a good many modifications on the ordinary methods of coupling. A new and also novel type of coupling which appears to have all the advantages claimed for it concerned with greater efficiency and much less cost in fitting is illustrated by the sketches herewith. It has already been fitted on high pressure steam piping on board a steamer, after being tested by hydraulic pressure to 800 lb. per square inch, and is giving every satisfaction.

The new coupling consists of a purely metallic joint between the two meeting ends of piping, and is maintained by flanges fitted loose on the pipes, coupled, of course, by the necessary bolts and nuts. It will be gathered from the illustrations that the end of one length of piping is bell-mouthed and is drawn up on a brass conical ferrule brazed upon the other end of piping. Closely drawn up, and bearing with absolute accuracy on this softer conical piece, the two harder materials



The New Coupling

thus make the metallic joint steam and water-tight and not liable to leakage in any way. No jointing material being used, water from any condensation

taking place in the piping will not impair the joint. There is no brazing required on the bell-mouthed piping, and the only brazing involved is that required in fixing the conical brass ferrule, C (Fig. 1), to the end of the other length of piping. This, of course, does not punish the end of the pipe nearly so much as if an ordinary flange had to be brazed upon it. The great defect in the present method, as is well known, is the weakening of the pipes caused by the brazing on the flanges, and leading sooner or later to the fracturing of the pipes immediately at the back of the flanges. The thickness lost at the back of flange when in position, due to the stretch in belling the end of pipe, is very little; in fact, only about one gauge, and on smaller pipes not so much. In short lengths of pipes, joined to valves or cocks, there is no brazing necessary. The bell-mouth also lends itself to taking away any strain which may become localized on the pipe at back of flange.

Both flanges of this new type of coupling (A and B, Fig. 1) are fitted loose on the pipes, and are made of either cast-steel or stamped mild-steel forgings. This material makes a much stronger flange, not liable to bend or to crack so easily as the present flanges, but if for any special reason brass is required, then manganese or hard brass can be satisfactorily adopted. The flanges are preferably oval in shape, for small-bore pipes especially, and require only half the number of bolts and nuts for secure fastening. These facts, and others which might be enumerated, mean a very considerable saving of time at the hurried later stages in fitting out new ships. Much, if not all, of the temporary fitting up, marking and taking down to bore and cut joints is rendered unnecessary. A big saving also to engineers and shipowners arises from the fact that no jointing material of any kind is required.

Regarding the coppersmith's time on work where these couplings are adopted there is no increase as compared with work done according to the present system. The bell-mouthing is made on the end of the pipe by means of a smooth-turned steel drift, either by

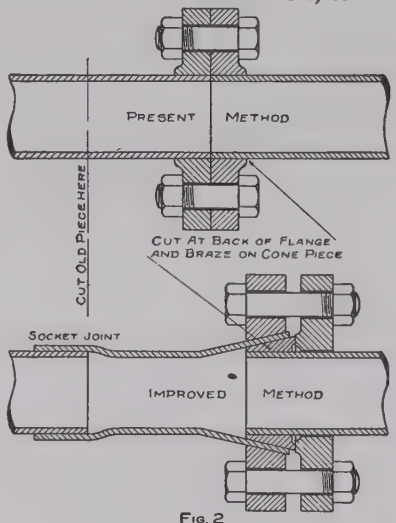


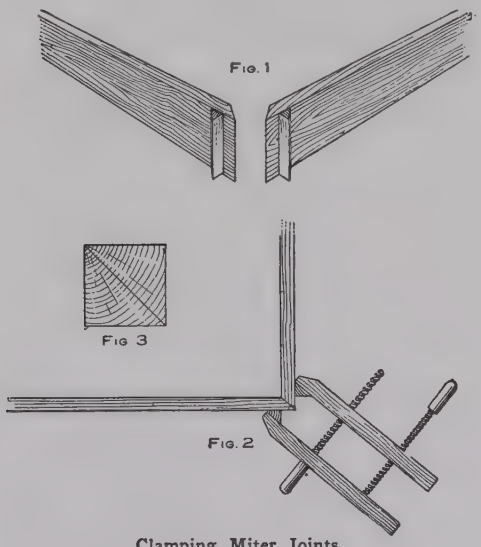
FIG. 2
Changing from Old to New

hand or by hydraulic power. If done by hand, the pipe is first heated and expanded with a smooth bar, similar to the practice in making saddle branches, to within half an inch of the finished bell, and then a drift is driven up cold to shoulder of same. If hydraulic power is employed, the end of the pipe is first annealed in the coppersmith's pipe-bending machine, and the drift is driven up to shoulder in one operation. In the case of smaller pipes, the bell-mouthing is done by means of a fluted tapered widener, with a square on end for ratchet, the pipe, of course, being caught in the vise with lead grips. The brazing metal brass cone-piece, C, is first turned to taper required, then brazed on with fire-clay round turned part. No grinding or polishing is required after brazing. If flange A be made of brazing metal, the tapered piece C can be cast in one with flange.

In repair work this new coupling adapts itself very easily, Fig. 2 being illustrative of this. The fact that all flanges and cone-pieces are interchangeable for same bore of pipe is of importance in this connection. Thus, at sea, if one pipe from any cause bursts, another pipe of same bore not in use can easily be made to replace it.

Method of Clamping a Miter Joint

After the miters have been cut true two blocks are glued on about 1 in. from the miter, as shown in Fig. 1.



Clamping Miter Joints

After the glue has set on the blocks the miters can be glued and a clamp screwed on, as shown in Fig. 2, and left until the joint is thoroughly dry, says a correspondent of Work, London. Remove the clamp and plane off the blocks. The blocks are made as shown in Fig. 3. A piece of 1 or 1¼-in. square stick, about as long as the base is deep, is sawed through its length diagonally endways to make the two triangular pieces.

A Convenient Method of Making Patterns

How often does the inventor want to see how a thing will "look in metal," but on account of the expense and delay involved dislikes to make a pattern and take it to the foundry. A wood pattern of some design, say, a handle, would take considerable time to make and finish up so it will make a decent casting.

In the case of many small articles, much trouble may be saved by making what the writer has termed "beeswax patterns." They may be made as follows: Pour the melted beeswax into a rough mould (a paper box will do) approximately the size you wish for your pattern. When this wax is cold, carve it to the desired shape, using a sharp knife slightly warmed. Make another rough mould similar to the first and fill with plaster of paris mixed with water to the consistency of cream. Immerse the beeswax pattern in this, leaving vents and gates, and taking care that no air bubbles form, and let stand until set and thoroughly dry. Slowly heat the plaster to a temperature sufficient to cause all the beeswax to run out of the gates and vents which have been provided. Pour in melted solder to replace the wax, allow it to harden and break open the plaster. You will then have a smooth solder casting, which, if necessary, can be worked to a better shape with the soldering iron. This solder casting may be used for a pattern which will give excellent results.

Beeswax lends itself well to this kind of "sculpturing," if rightly handled. It may be turned on a lathe, drilled and generally fashioned at will. This method is not practicable where a core, as for the inside of a ball, is required, but otherwise has a wide range of usefulness.—Contributed by C. W. Neiman, New York City.

Courtesy American Vehicle

Carriage Body Corner Design

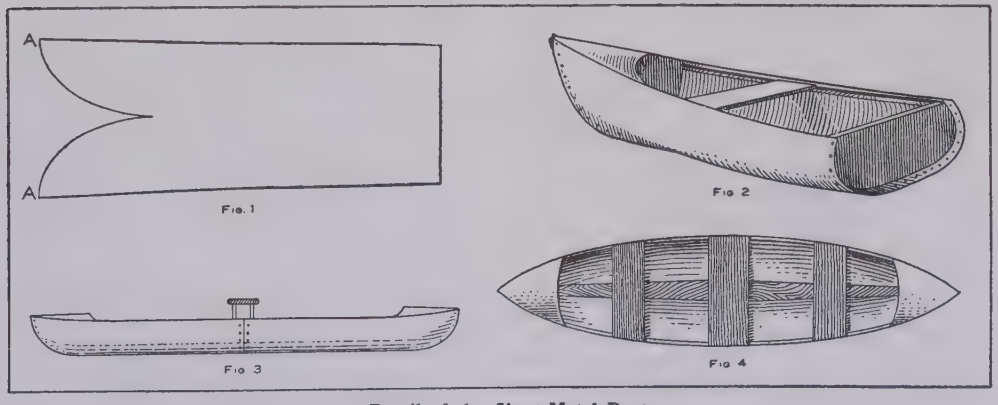
SHOP NOTES

How to Make a Steel Boat

Secure two pieces of sheet metal, preferably galvanized, each sheet with a length equal to one-half the desired length of the boat. Cut each piece to the shape shown in Fig. 1. Bring the ends AA together and rivet them as shown in Fig. 2. The pointed end should be covered, inclosed, and soldered to make an airtight compartment.

The halves can be joined together in two different ways, either by bringing the fore and after parts together and riveting them, or by putting a tight bulkhead in each half as shown in Fig. 2, and joining them together with the seat as shown in Fig. 3. If the latter method is adopted, the ends should telescope just a little, and be held together by the standards of the seat.

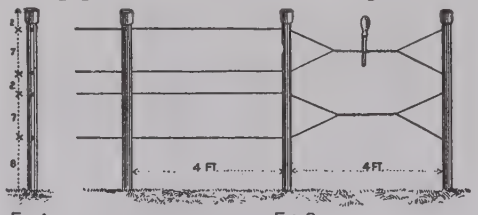
Should an accident occur it would only be necessary to raise the seat and allow the leaky half to sink while the occupant could float safely away in the other half. It would be advisable to use the best quality of paint.—Contributed by W. D. Brooks, Paterson, New Jersey.



Detail of the Sheet-Metal Boat

How to Make a Twisted-Wire Lawn Fence

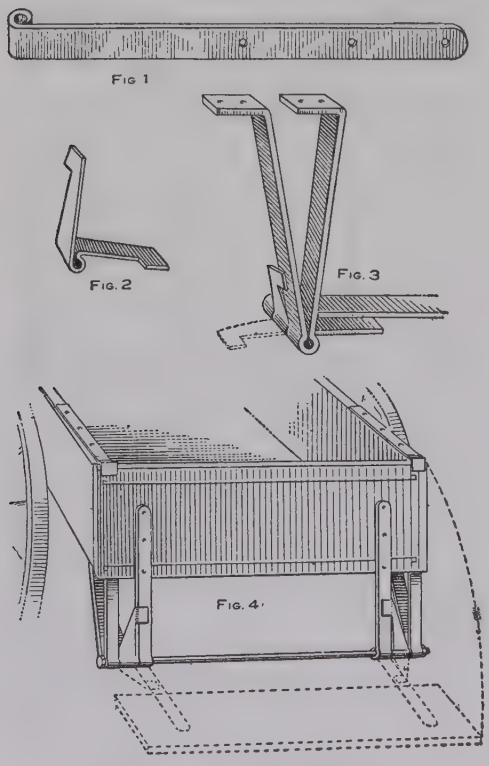
Procure several iron posts, enough to complete the length of the fence when they are set 4 ft. apart. A piece of 2-in. pipe, 5 ft. long, with a cap turned on the top makes a good post. Drill four holes through each post as shown in Fig. 1, and place them in the ground as you would an ordinary post. Run a strand of wire through each hole loosely, but be sure to get the slack in the wires equal. Place a small bar of iron, a screwdriver will do, between the two top strands of wire and twist them to take up the slack as shown in Fig. 2. Twist the two lower strands in the same manner. If the wire becomes slack at any time, a few turns will tighten it.—Contributed by J. F. Campbell, N. Somerville, Mass.



Twisting the Wire

Combined End Board and Step for a Light Wagon

The accompanying illustration shows an end board attached to a wagon in such a way that it can be lowered and



The End Board Turns Down

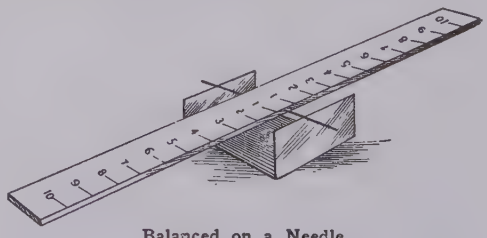
used for a step. Two straps of iron, one of which is shown in Fig. 1, are similar to one side of a hinge with the end board bolted to their upper ends. The eye made on the other end of the straps is slipped over a rod which passes through two brackets attached to the under side of the rear end of the wagon box. The catch that holds the end board in position for the step is shown in Fig. 2. One of these catches is provided for each bracket and hinge strap. They are attached to the bracket and rod as shown in Fig. 3. The complete arrangement appears as in Fig. 4. The dotted lines show the location of the step when the end board is lowered.—Contributed by R. C. Knox, Colorado Springs, Colo.

A Substitute for a Balance

Procure a strip of pine wood, about $\frac{3}{8}$ in. wide and 12 or 15 in. long, and place a fine needle through the middle of the wood or attach it by means of wax. Then get a piece of sheet tin or other metal, $\frac{1}{2}$ in. wide and 1 in. long, and bend its edges up $\frac{1}{4}$ in. on each side. Place the needle ends on these upturned portions of the tin. Should the beam not balance perfectly, cut off thin pieces of wood from the heaviest end until it does balance. Divide the strip of wood into 20 equal parts, 10 on each side of the middle, and mark them 1, 2, 3, etc., with the smallest numbers at the middle.

Three weights are required, 1-gr., 1/10-gr. and 1/100-gr. The 1-gr. can be made by weighing out a piece of thin brass wire on a chemist's balance. The wire should be bent double. The 1/10-gr. is obtained by placing the 1-gr. weight on one side of the balance at the point marked 1, and putting a smaller piece of wire on the 10 mark at the opposite end of such size as will place the beam in perfect balance. This wire will be the 1/10-gr. weight. The 1/100-gr. weight is obtained in the same manner as the 1/10-gr., using the 1/10-gr. weight to start with instead of the 1-gr. weight.

A button of gold or silver is weighed by placing it on one of the 10 marks and one of the weights on the opposite 10 mark that will make the beam balance. The weight placed on the 10 mark represents the weight of the gold or silver button. If the wire weight is too heavy, move it toward the middle



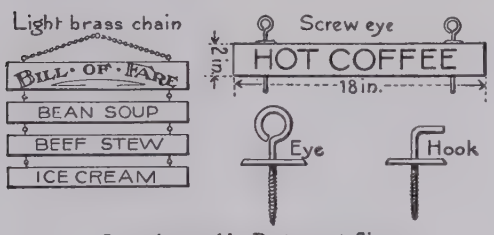
Balanced on a Needle

of the beam to a mark where it will be a little lighter than the button. Leave both weight and button in these posi-

tions and take the 1/10-gr. weight and place it on the end of the beam, then move it toward the middle until it rests on a mark where this weight, together with the first weight, is a little lighter than the button. Then proceed with the 1/100-gr. weight in the same manner. For example, suppose that the 1-gr. weight is on 8, the 1/10-gr. weight on 7, and the 1/100-gr. weight on 3; the weight of the button is .873 grains, or a little more than 8/10 of a grain. Another problem; if a certain weight of ore yields 8/10 gr., how many grains will there be in a ton of similar ore? There are 29,166 troy ounces in one ton. The number of ounces of precious metal in a ton of ore can be readily figured out.—Contributed by F. B. Percival, Paramaribo, Dutch Guiana.

Bill of Fare Sign for Restaurants

The accompanying sketch shows how the owner of a restaurant made



Interchangeable Restaurant Sign

a sign which could be quickly changed at any time. The top board is 5 in. wide and 18 in. long. The others are all 2 in. wide and 18 in. long. Each board carrying an inscription is attached with hooks and eyes as shown. This makes it possible to remove a board or any number of boards when the bill of fare is changed.—Contributed by H. G. Cramer, S. Greensburg, Pa.

A Lumber Yard Burglar Alarm

The accompanying sketch shows how I constructed an alarm to catch a thief taking lumber from my yard. An ordinary electric bell with two dry cells was used in the circuit, but the main feature was the contact points. These I made from a hose supporter clip with one jaw insulated and a piece of lead attached as shown in Fig. 1.

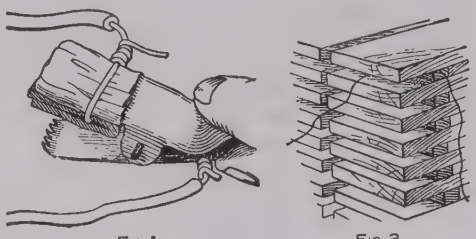


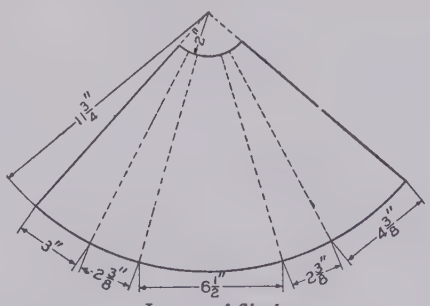
Fig. 1 Fig. 2

Contact Points for the Current

When the clip was held apart, the current was broken. I placed the clip under the top board of a pile of lumber, as shown in Fig. 2. The wires were run to the office and attached to the bell and battery. When the board was taken from the pile the clip closed and made the connection for the current. The thief was caught.—Contributed by J. S .Grant, Winchester, Va.

A Wedge-Shaped Electric Light Shade

Take a piece of cardboard and lay it out according to the dimensions given in the accompanying sketch. Cut it out on the heavy lines and then bend it on the radial dotted lines and fasten the edges with paper fasteners. The result is a wedge-shaped shade which will just fit an electric light bulb and when it is in place will throw a wedge-shaped block of light. This is an im-

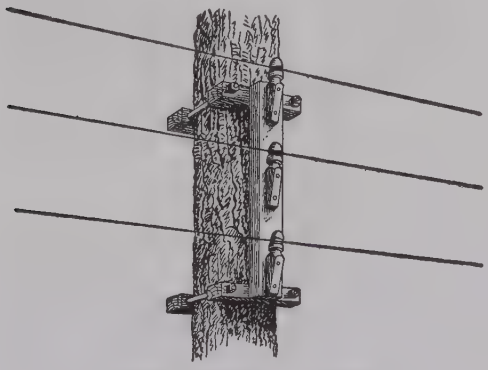


Layout of Shade

provement over the round shade which allows the light to strike the eyes—Contributed by J. H. Crawford, Schenectady, N. Y.

Line Wire Supports for Trees

Almost all devices for attaching line wires to the body of trees will injure their growth in some way. Fasteners of any kind should never be nailed to



Clamp Attached to a Tree

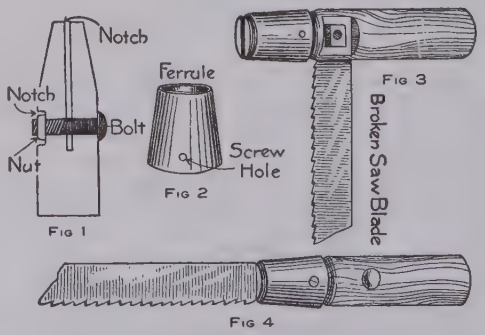
the tree or wires tied closely around the limbs. Tall trees, having limbs only at the top can be used for a line wire support by attaching a clamp on the main body as shown in the sketch. This clamp will not injure the tree in any way as there is nothing driven into it. The clamp consists of four pieces of pine, or some other suitable wood, cut on a curve to fit the trunk of a tree, four bolts, and a 2 by 4-in. upright piece. Two of the curved pieces are nailed to the upright piece as shown. A board is nailed on top of the end grain of the upright piece to prevent the rain from entering the wood and splitting it. The two parts are bolted together on the tree trunk and one or more insulators are attached to the upright piece as may be necessary.—Contributed by O. E. Trounes, Chicago, Illinois.

Oil Slots in Center Holes

Some attention is required to keep the piece of work lubricated that runs on the dead center of a lathe. The hole must be oiled when the piece is put in the machine and after it warms up under the cut, the lathe must be stopped occasionally and the center run back so that more oil can be applied. The following is a good way to treat center holes—in fact it is the method used in many shops: Three small slots are cut in the center hole from the outside down to the middle. A 3-cornered file is ground off on the end to 60 deg.—the angle of the lathe centers—and the edges sharpened. This is used as a tool for cutting the slots. The three slots are cut at equal distances apart, and deep enough to carry the oil to the center of the hole while the piece is turning on the center. The slots are cut in large work with a round-edged chisel. Any burr left after cutting the slots must be removed with the center drill.—Contributed by Donald A. Hampson, Middletown, New York.

Adjustable Handle for Using Broken Hacksaw Blades

A broken hacksaw blade is usually laid aside with regret, especially if the blade is of any considerable length. The device illustrated will prevent a broken blade from becoming entirely useless. It is made of a short piece of broomstick, Fig. 1, notched and tapered to receive a ferrule, Fig. 2. A bolt is run through the side at right angles to the slot and a square-shaped depression is cut out to receive the nut. The saw blade is slipped down in the notch and the bolt run through and tightened. Then the ferrule is slipped



Using a Broken Hacksaw

on and fastened. It is also adjustable to the positions shown in Figs. 3 and 4.—Contributed by James M. Kane, Doylestown, Pa.

A Home-Made Power-Driven Vacuum Cleaner

There are comparatively few households that can afford to own a vacuum cleaning outfit. It is possible, however, with a few simple tools and materials and two or three evenings of work, to build a machine that will compare very favorably with those now on the market.

This pan, shown at C, must be fitted with two valves which are the most important and difficult part of the work. Cut, from a smooth piece of pine, 1 in. thick, two discs 5 in. in diameter with a 3-in. hole in the center of each. From a plumbing supply house, procure a sheet of packing rubber, ⅛ in. thick,

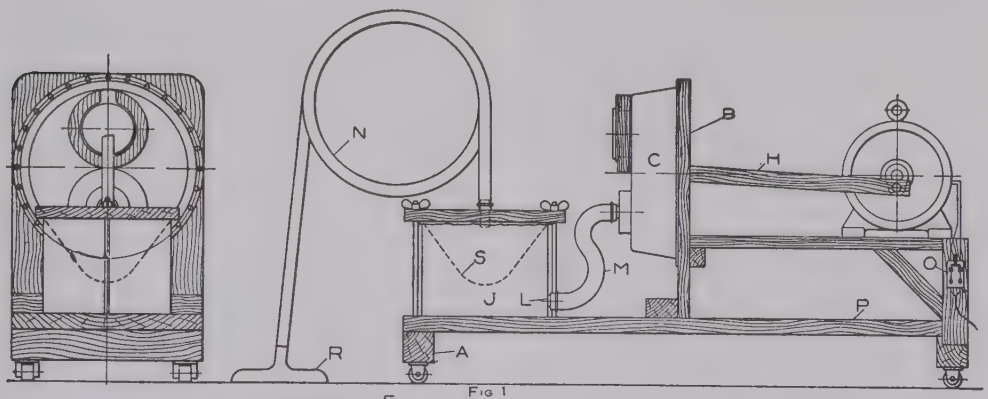


Fig 1

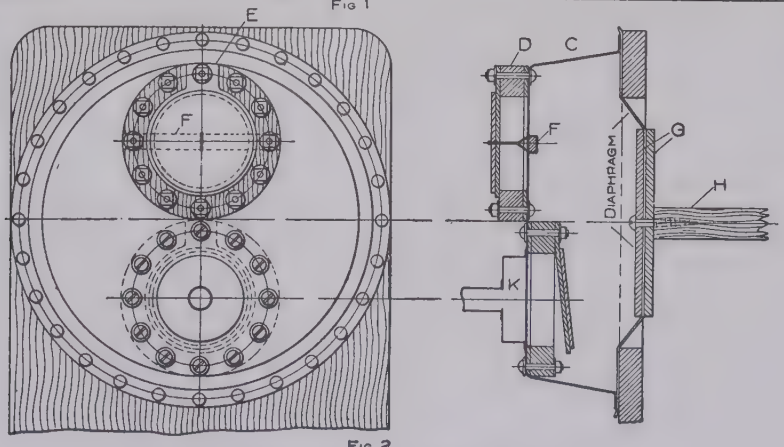


Fig 2

General Layout and Details of a Vacuum Cleaner

First take a good pine board, 1 in. thick, 12 in. wide, and 36 in. long, and nail to each end a 12-in. length of 2 by 2-in. pine, as shown at A in Fig. 1 of the accompanying sketch. Next, a ¾-in. board, 12 in. wide and about 15 in. long, should be fastened near the center and at right angles to the first board, as shown at B. Procure at a hardware store a tin pan measuring about 10 in. in diameter and 3 in. deep. and cut from it two discs, each 5 in. in diameter, and two, 3½ in. in diameter. One of the discs of wood should be fastened to the back of the pan at the top, as shown at D, Fig. 2, with one of the 5-in. diameter rubber discs placed between the tin and the wood, and both secured to the tin by a row of small bolts around the outside edge of the wood. A hole, 3 in. in diameter, can now be cut through the tin

and the rubber, using the hole in the wood as a guide. Two discs, with a diameter of 3¼ in. should be cut from cigar-box wood and fastened centrally on the 3½-in. rubber discs. One of the latter pieces should be fastened by its top edge to the top edge of the 5-in. disc of wood as shown at E. This forms a flap valve, and great care should be taken to see that the rubber disc covers the opening all the way around when the valve is closed, so that it will be airtight. A spring will be necessary to quicken the action of this valve. This is best made by fastening a narrow strip of wood across the valve opening on the inside of the pan, as shown at F, and attaching a rubber band to the center of the valve and to this stick. This completes the outlet or exhaust valve. Another valve must now be made in the same manner and fastened to the bottom of the pan on the inside, as shown. This is the inlet valve and works in the opposite direction to the outlet valve just described.

Next procure a piece of leatherette or pantasote about 12 in. in diameter, or large enough to cover the opening of the pan. This is to be used for the diaphragm. Cut a round hole about 8 in. in diameter in the upright piece B, Fig. 1, its center about 7 in. from the top. From a piece of ½-in. pine cut two discs 6 in. in diameter. Also secure a piece of hardwood, H, 1 by 1 by 14 in. The discs, G, should now be placed, one on each side of the leather diaphragm, exactly in the center, and fastened to one end of the 14-in. piece by means of a long screw. This piece H should be exactly in the center of the diaphragm. The pan can now be put in place. Place the diaphragm over the hole in the board B, the stick projecting through the hole. The pan is now placed over the diaphragm and held by means of small bolts around the edge. The diaphragm between the wood and the tin acts as a gasket and makes an airtight joint.

Secure an airtight tin can about 8 in. in diameter and 12 in. high and fasten it to the baseboard as shown at J, Fig. 1. A tin cover such as a baking powder or coffee can cover should now be soldered over the inlet valve as shown at K, Fig. 2. Solder a hose connection in the center of this cover and also one in the side of the can as shown at L, Fig. 1. Couple a short piece of hose, M, to these connections. The strainer, S, should be made of very strong and closely woven unbleached drilling. Make it in the form of a bag with a 1-in. hem at the top, and place it in the can as shown by the dotted line, having the hem fit smoothly over the outside edge of the can. The top of the can is made from a perfectly flat pine board about 1 in. thick, and is held in place by two ¼-in. rods fastened in the baseboard. These rods have thumb nuts on the top which allows the cover to be readily removed or tightened down. It is best to place a rubber or leather gasket between the cover and the edge of the can so as to make an airtight joint.

An airtight piece of garden hose may be used for the suction hose, N, the one end being fastened in the center of the cover and the other to the brush or nozzle, R, Fig. 1. It is best to buy this nozzle as it would be rather expensive and unsatisfactory if home-made.

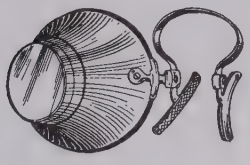
This machine may be driven by an electric motor of about 1¼ hp., which should be placed in the position shown in Fig. 1. The end of the stick H is fastened to a crank on the motor shaft and allowed to have about a 1½-in. stroke. The motor is wired up with a switch, O, and it would be best to connect in a rheostat, if the builder has one, to allow the regulation of speed best suited to the machine. This can readily be determined after the machine is started. If the builder is not fortunate enough to possess an electric motor and the current necessary to run it, a small water motor will do equally well; or it may even be run by hand, by means of a long lever, fulcrumed at P.

The machine is now ready for operation. First, however, test it all over for leakage, as its success depends upon being perfectly airtight. As the motor

revolves, the rod H is drawn forward bringing with it the diaphragm. This creates a partial vacuum in the tin pan, C, which opens the inlet valve, sucking the air through the suction hose and strainer, the air carrying with it the dust and dirt. The refuse is left in the strainer bag while the air goes on through the connecting hose and pan, and outlet valve into the atmosphere. After the article being cleaned has been gone over thoroughly, care being taken to hold the nozzle flat and tight against the material, the cover may be removed and the bag emptied. The quantity of dirt found in the bag will be sure to convince the operator of the efficiency of the machine.—Contributed by Paul S. Winter, Greenville, Pa.

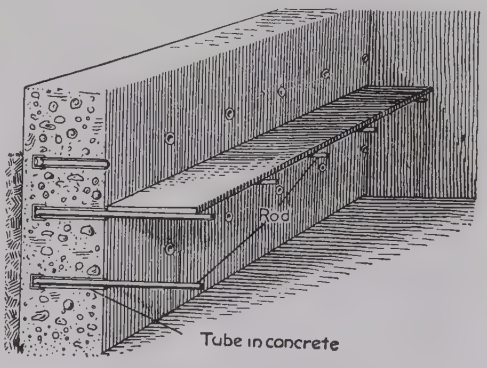
A Jeweler's Eyeglass Holder

Using an eyeglass for any length of time becomes tiresome for the muscles of the face. The accompanying illustration shows how a little attachment can be used so the wearer will not have any more discomfort than wearing a pair of nose glasses. A small hole is drilled through the rim of the eyeglass to suit the clamp of an ordinary nose piece used on glasses. The clamp is bent to fit the rim and the screw placed in position. The nose piece will hold the eyeglass as securely as it will a pair of ordinary glasses.—Contributed by H. D. Chapman, Washington, D. C.



Shelving Brackets for Cement Walls

When constructing a cellar or basement wall of concrete for a house or factory place iron pipes horizontally in the forms in a row where shelves are wanted so their inside ends will be flush with the finished wall. The pipe should be ½ or ¾ in. in size, and of such a length as to not quite reach through the wall. It would be well to screw pipe caps on the ends placed in the concrete. The pipes should be placed close enough together in each row to keep the shelf boards from sagging. Fit each pipe with an iron rod

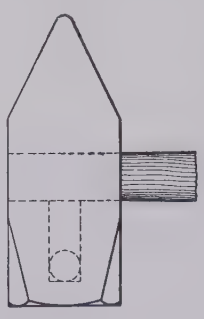


Removable Brackets

of sufficient length to slide in the pipe and have enough projecting on which to lay the shelves. When the shelves are not needed, the iron rods can be pulled out, thus clearing the surface of the wall. Where concrete walls extend all the way up, this method can be used anywhere in the building.—Contributed by H. Horace Romig, Allentown, Pa.

A Non-Rebounding Hammer

A hammer that will not rebound when a blow is struck, and one that will not cause that soreness in the wrist after a hard day's work is shown in the accompanying sketch. The hammer head is forged in the usual manner and a ½-in. hole drilled through the face to the handle hole, before tempering the steel, then the outer end of the hole is plugged and the hammer head heated and tempered. Insert a ½-in. steel ball in the hole, put the handle in place and the hammer is complete. When a blow is struck with the hammer, the ball strikes instantly and prevents the rebound.—Contributed by H. C. Faber, Monongah, W. Va.



Picture Frame Clamp

Various devices are used to clamp miter joints while the glue sets, yet none provides a way to hold four joints

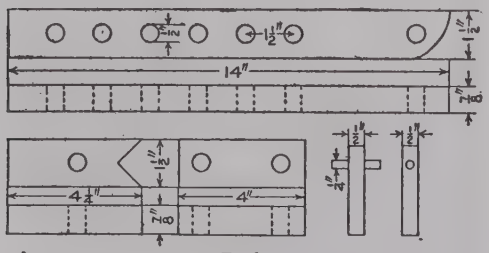


FIG. 1

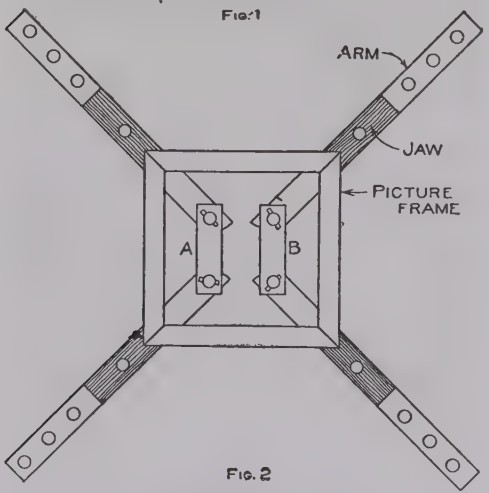


FIG. 2

Details of the Clamp

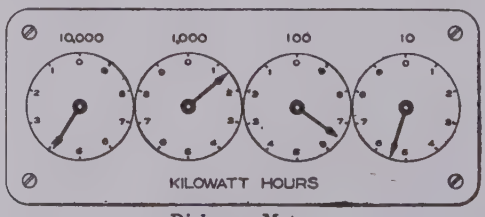
of a picture frame at one time, and hold them in such a way as to make the frame perfectly square when it is finished. Illustrated herewith is a clamp having four arms on which are four adjustable, V-shaped jaws that draw together simultaneously with the pressure from one screw clamp. The dimensions of the parts are shown in Fig. 1, and they appear as shown in Fig. 2 when put together with a picture frame in the jaws. The jaws of the screw clamp are applied to the cross-ties at A and B in Fig. 2. The drawing of these two cross-ties together pulls the four extending arms concentrically, thus drawing all four corners of the frame together and keeping it perfectly square while the glue sets. The jaws of the picture frame clamp are adjustable on the extending arms for different sized frames.—Contributed by Herman G. Gesswein, Brooklyn, New York.

How to Read a Wattmeter

Meters for measuring the amount of electrical energy furnished to consumers are known as recording or integrating watt-hour meters and are made in several different forms to meet varying conditions. The registration of a meter must be very accurate to meet commercial requirements owing to the fact that errors are cumulative and even a small percentage error will, in time, become important from a financial standpoint.

Electric power is measured in watts, and is represented by a current of 1 ampere under a pressure of 1 volt per second. Thus one watt is equal to 1-746th of a horsepower. The kilowatt is 1000 watts and the kilowatt-hour is 1000 watt-hours.

The dials on a wattmeter are arranged similar to those on a water or gas meter. The dial at the right is the lowest reading dial and gives the kilowatt-hours, each division corresponding to the use of one kilowatt-hour of power. The next dial to the left records tens, the next hundreds, the next thousands, and so on. Read from the left to the right, taking the smaller of any two numbers between which the pointer may stand. As an example, take the dial shown in the sketch in which the lowest division is 10 kilowatt-hours. Starting with the left hand dial, the pointer is between 5 and 6, so the reading is 5. For the next dial



Dial on a Meter

the reading is 6; for the next, 1; and for the next, 4; so that the whole reading will be 4,165; but as the last dial reads in tens, the number of kilowatt-hours recorded is 41,650.

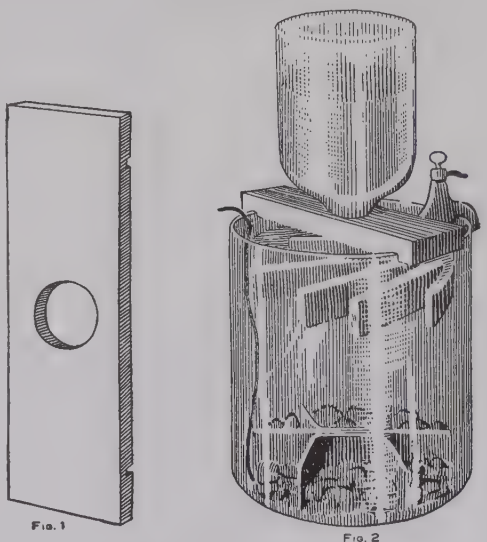
How to Treat Knots Before Painting

Knots and sappy places in boards are hard to cover with paint so that it will stay for any length of time. It has always been a problem with painters to effectually treat such places before laying on a coat of paint. The usual way is to cover them with one or two coats of shellac, and sometimes apply aluminum leaf, but this is not sufficient, especially if they are in a position where the rays of the sun will fall upon them.

The only way to kill bad knots and sappy places is to draw out as much sap as possible before covering them up with paint. This can be done with a gasoline torch, such as is used by painters and electricians. Hold the torch with the flame striking the knot or sappy place until the wood surrounding it begins to char. If the knot is an exceptionally bad one, and located in a prominent place, such as a porch column, trace around the knot with a piece of charcoal, lay a sheet of white asbestos on it, and rub over the outside surface around the edge of the knot to transfer the charcoal marking to the asbestos. Cut the asbestos out on the marks, thus making a hole the size of the knot. Lay the asbestos on the wood so it will cover all the surface, leaving the knot exposed. Apply the heat as before. In this way the sap can be drawn without injuring the wood surrounding the knot. After the sap has been drawn, apply a coat of shellac, and when dry smooth up with a putty made from whiting, white lead and Japan gold size. Knots treated in this manner will not show through the paint.—Contributed by S. Nelson, Chicago, Ill.

Automatic Filler for Gravity Cells

Telegraph companies and anyone using gravity cells have no little trouble in keeping the jars filled with liquid. The level of the liquid must be kept near a certain point to have the cell produce the required current. The accompanying illustration shows a device that will automatically fill each jar and keep the level of the liquid at almost the same point at all times. Each



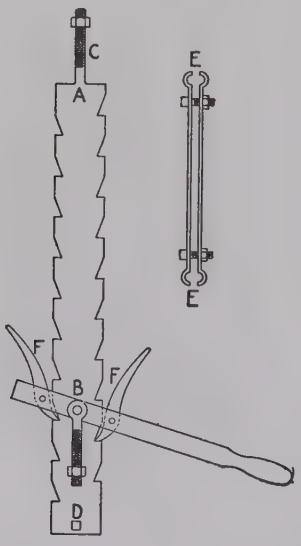
Filling a Cell Automatically

jar is provided with a wood holder, as shown in Fig. 1, which is placed across the top and the neck of a bottle inserted in the hole with the bottle inverted as shown in Fig. 2. The bottle is filled with liquid. Just as soon as the level of the liquid in the jar is lowered below the mouth of the bottle by evaporation, the liquid will run from the bottle and supply the deficiency. When the jar is filled to the proper level, which is about level with the mouth of the bottle, the liquid will stop running from the bottle.—Contributed by J. A. Harrill, Mooresville, North Carolina.

¶The use of acetylene for mine lights has the advantage over candles and kerosene as a fuel. Candles will remove seven times and kerosene five times as much oxygen as acetylene. The products of combustion given off by candles are ten times and from kerosene nine times that of acetylene. The light from acetylene will reach the part to be illuminated, while that from candles or kerosene will be lost in the smoke and mist which so rapidly accumulate.

Tightening Elevator Belts

Tightening elevator belts is not a very desirable task, as anyone who has had much of it to do knows, says a correspondent of the American Miller. The accompanying sketch shows a simple tool for tightening and holding the belts which works to perfection and which can be made by any blacksmith. First secure two common wire stretchers from a hardware store and have a blacksmith remove all the chains and hooks. Then instead of the chain on end A have a 4-in. bolt made of ½-in. iron welded on, and where the hook fastens on at point marked B have a ring bolt put on so it will work easily. Then take the handle off one side and put on the opposite side so you will have one right and one left-hand stretcher. This is in order to work both bolts on the inside. Also have a pair of clamps made as shown in the sketch.

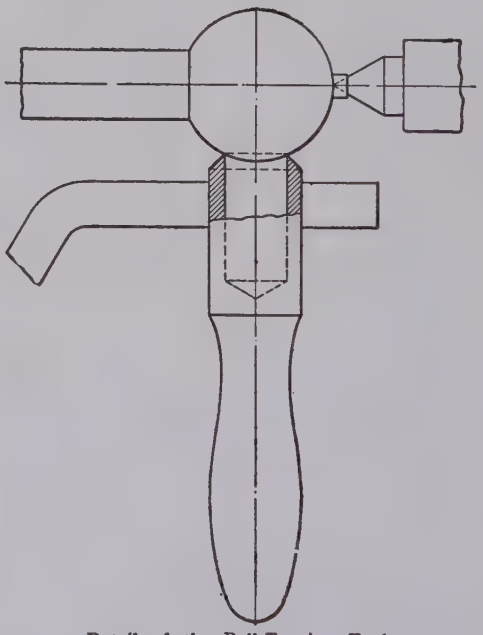


In operation, put one clamp on each end of the belt, screw them up tight, using ⅜-in. bolts to go through them. Put them on square, then slip bolt C through opening E in clamp, and screw up until you have a full thread; then grasp handles F and pull them toward the pulling bar (which lowers the handle to which lower bolt is fastened) until the bolt fastened on it will go through the opening E in lower clamp. When both clamps are on and both stretchers connected, all you have to do is to work the lever up and down to get the belt as tight as you want it; then the stretchers will hold the ends until you can fasten them. By grasping the handle it will slacken up. Take the clamps off and lay them away for future use. The clamps should be made long enough for the stretchers to work outside of the legs of the elevator.

This device costs very little and will last a lifetime. It can be carried in a tool box and takes up very little room as the handles can be taken off by removing stove bolts D at the lower end of the pulling bar.

Tool for Turning a Round Ball

A perfect ball can be turned on a lathe with a special rotating tool rest, but some lathes, and especially wood lathes, are not provided with this attachment. The tool as shown in the illustration makes it possible to turn a ball without the aid of a rotating tool rest. The tool is made from a round bar of tool steel turned up as shown



Detail of the Ball-Turning Tool

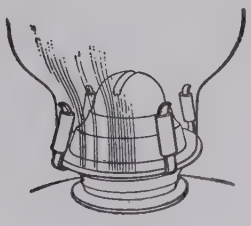
and a hole drilled in one end. The metal around the hole is chamfered and hardened for a cutting tool. The chamfered edge is then ground, taking

care to keep the cutting edge on a perfect level. This is done by applying the edge to a surface plate during the grinding to see if it is kept straight.

The ball on a vise screw is a fitting example in using the tool. The material is put in the lathe and roughed off to the size and then the tool is applied by hand. The sharp edge of the tool chips off the high places until a perfect sphere is obtained. The process is then continued until the proper diameter is made.—Contributed by J. R. Weaner, Plainfield, N. J.

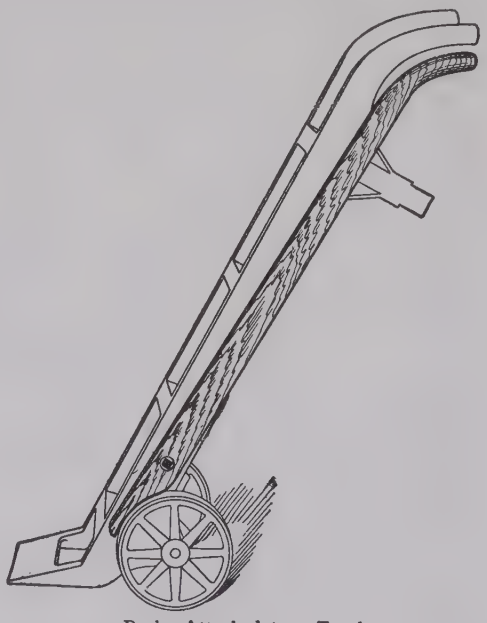
Holding Lamp Chimneys on Burners

The ordinary lamp chimney, setting in the four standards of the burner, often falls from its place when the lamp is not carried cautiously. Many chimneys are broken in this way. An easy way to keep the chimney in place is to procure some small rubber hose similar to that used by milliners in covering the stems of artificial flowers, cutting four pieces, each about 1 in. long, and fitting one piece on each of the four spring posts of the burner. The lamp may be turned upside down without danger of the chimney falling from its place. This rubber hose will last for months as the heat does not reach the lower part of the chimney or the burner base.—Contributed by Chas. Manasco, Memphis, Tenn.



A Brake for a Truck

A big truck with a load of 600 or 800 lb. is hard to handle and especially so on a slight incline. These trucks are constructed without brakes as they are generally used on a level surface. A brake attachment is quite easy to make and fasten to a truck where it is to be used on an uneven floor. One piece of hard wood as wide as the face of the truck wheel and shaped as shown in the sketch can be fastened loosely to one of the handles with a bolt so it will swing free of its own weight and not touch



Brake Attached to a Truck

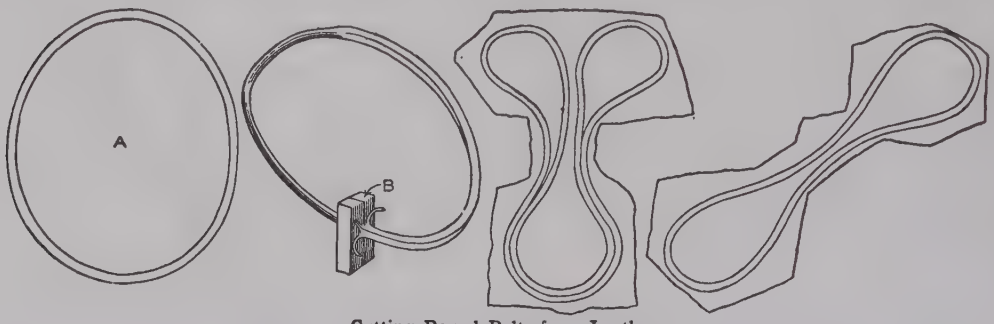
the wheel. A slight pull with the fingers on the lever will apply the brake. The wood lever can be put on either side of the handle to suit the position of the truck wheel.—Contributed by D. Higbee, Omaha, Nebr.

Courtesy American Vehicle

Corner Design for Carriage Bodies

A Round Leather Belt Without a Joint

At first thought this would seem impossible, but it is a very simple matter to make leather belts without joints of any kind. First cut out a large narrow washer A and then draw it through a split die B the same as making an ordinary round belt.

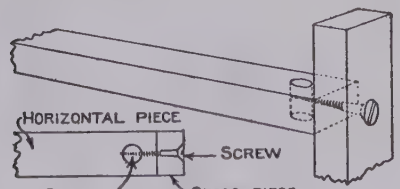


Cutting Round Belts from Leather

If the belt is to be a long one, the blanks need not be circular but can have a dumb-bell or other shape, depending on the shape of the piece of leather. The important thing to remember is to avoid sharp turns.—Contributed by E. W. Davis, Chicago.

Making Screws Hold in the End Grain of Wood

It is often necessary to fasten one piece of wood to the end of another by means of screws. Wood being a fibrous material, it can be readily understood that when a screw having sharp threads is put in the end grain parallel to these fibres the threads cut them in such a way that, when an extra strain is put upon the parts, the screw pulls out, bringing with it the severed fibers. The accompanying sketch shows how this difficulty may be overcome, and at the same time make the screw hold firmly. A hole is bored and a dowel, preferably of hardwood, glued in it, the grain at right angles to that of the piece.



Screw-Holding Joint

The size of the dowel, and its location, can be determined by the diameter and the length of the screw. The dowel need not extend all the way through the piece, but should be put in from the surface where the grain of the dowel will be least objectionable.

When putting screws in hard wood much labor will be saved by applying soap to the threads.—Contributed by Geo. M. Gaither, Baltimore, Md.

How to Make Sandpaper

Sandpaper, or, more generally speaking, glasspaper, is the chief abrading material used in woodworking, and consists of strong paper coated with powdered glass. In the manufacture of glasspaper, first the glass is washed and sorted, and then broken very fine by stamps or other machinery. The glass chiefly used for best glasspaper is that from old port wine and stout bottles; this, when pulverized, is of a golden color. The different grades of glasspaper are numbered from 3 to 0, and even finer, and there are corresponding sieves to divide the various grades, or to "size," as it is technically called. These sieves are numbered from 140 to 30, the numbers representing the number of meshes per lineal inch; the finer sieves are covered with Swiss silk, the remainder with woven wire. In this part of the process considerable care must be exercised, as one large particle

of glass on a sheet of fine paper would scratch the work upon which it was used and would produce an uneven surface.

The placing of glass on paper requires considerable skill and experience, says Woodworkers' Review. The workman has delivered to him plain papers in reams of 120 sheets, each sheet making four sheets of ordinary size. The appliances used are a copper tank holding 56 lb. of glue, a table, a a bench on which the sheets are laid to cover them, with a cutting machine and a press for packing and tying glass, a hot plate for firing the sheets, and a drying room.

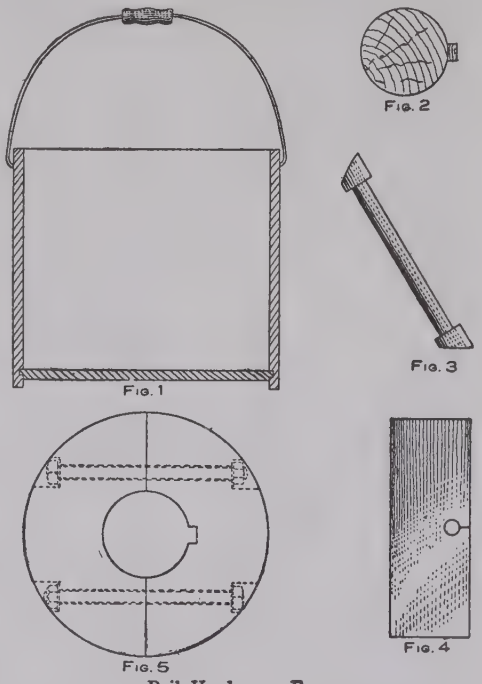
A ream or two of paper is placed on the table and the top sheet is coated with glue by means of a brush resembling a shoe brush, but with longer hair. The sheet is lifted by two corners and laid on the bench, glue side uppermost; the bench has a border standing up some 7 or 8 in. high on three sides, with a narrow fillet in front. Powdered glass is simply thrown or scraped over the sheet, which then is raised from one side so that the superfluous glass runs off on to the bench and is used again. The sheet is then placed on the hot plate, a hollow, flat, iron bench heated with steam; this causes the glue to boil up and thus securely fixes the particles of glass on the paper. All this is done much more quickly than it can be described.

After drying, the sheets are cut up and arranged in quires and reams, ready for the market. Glasspaper has entirely replaced the old-fashioned sandpaper. This was made in the same way as glasspaper except that sharp, fine sand instead of glass was used. Custom, however, has perpetuated the name of sandpaper, and we hear but seldom the name "glasspaper."

¶Do not draw the hairs of a painter's pencil through the fingers as it will curl them out of shape. Roll the quill between the palms of the hands. This will cause the hair to spread out and reveal any defects.

How to Make a Cement Split Pulley

We had occasion to use a pulley on a 4-in. line shaft and we could not get one with a 4-in. hole. As it was necessary to have a pulley immediately, we set about to make one of cement. A straight-sided candy pail, as shown in Fig. 1, made a convenient form of the right size for the diameter of the pulley. The hole for the 4-in. shaft was made with a wood core, as shown in Fig. 2, to which was attached a strip of wood the same size as the key. Two round pieces of wood with blocks attached to their ends, as shown in Fig. 3, were used as cores to make holes for the bolts. These cores were bored out after the cement had set. Two pieces of tin, as shown in Fig. 4, were used to separate the pulley in halves.

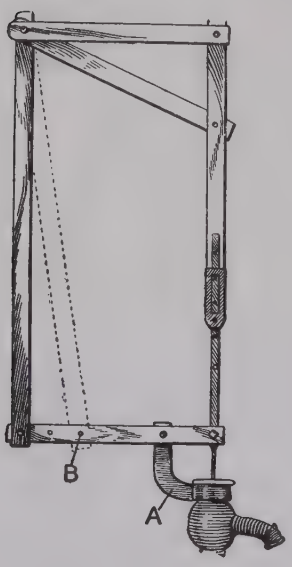


Pail Used as a Form

The complete pulley is shown in Fig. 5. This temporary concrete pulley did good service for some time, until another could be supplied. A pulley made up in this manner, using a neat cement mixture and well reinforced with wire mesh will stand considerable speed.—Contributed by C. C. Brabant, Alpena, Mich.

Stroke Reducer for a Windmill Pump

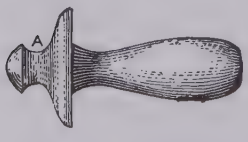
The accompanying sketch shows a way to reduce the stroke of a pump rod where a windmill is used for power.



This device can be used to advantage on pumps raising water from deep wells, or where a small amount of water is to be drawn. This will also enable a wheel to run in a light wind and pump the water. The device consists of a bracket arm attached to the windmill pump rod, at the outer end of which is attached a connecting piece that operates the substitute for the pump handle. The connecting piece can be fastened at any one of the holes on the handle as at B, thus changing the stroke of the pump rod. The handle works on a fulcrum, A, and drives the pump rod in an opposite direction to the windmill rod. A sliding device is used as shown to accommodate the different movements of the two rods.—Thos. L. Parker, Olaf, Iowa.

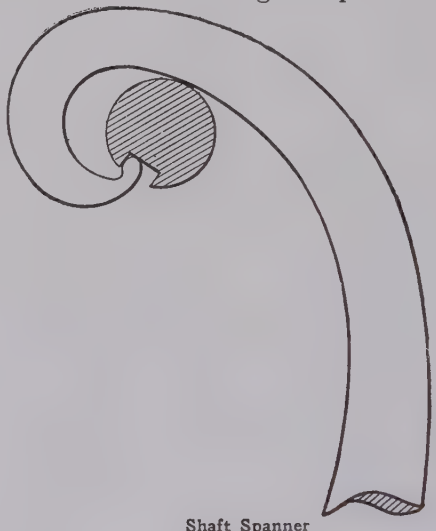
A Detached Wheel-Turning Handle

The handle illustrated is very useful in turning wheels with spokes on which there is no projection for the hand to grasp. One of the principal uses for this handle is for turning the tailstock wheel of a lathe. Some lathes have handles attached and others are made smooth. Place the part marked A in the sketch against the spoke of a wheel and push forward as if you were cranking with a handle attached to the wheel. —Contributed by G. Crawford, Jr., Schenectady, N. Y.



A Spanner Wrench for Shafts

The accompanying sketch shows a tool that has proven itself very useful. The shape shown is the result of something like two years' experience, says a correspondent of the American Machinist. It is christened the "twister" and is used for revolving (by hand) armatures and revolving fields of electrical machines during the process of



Shaft Spanner

erection and inspection and of course, works equally well on other similar things. The need of something of the kind was strongly felt by the inspector who found the keyways on the shafts frequently damaged by the use of monkey wrenches, and pipe wrenches by erectors.

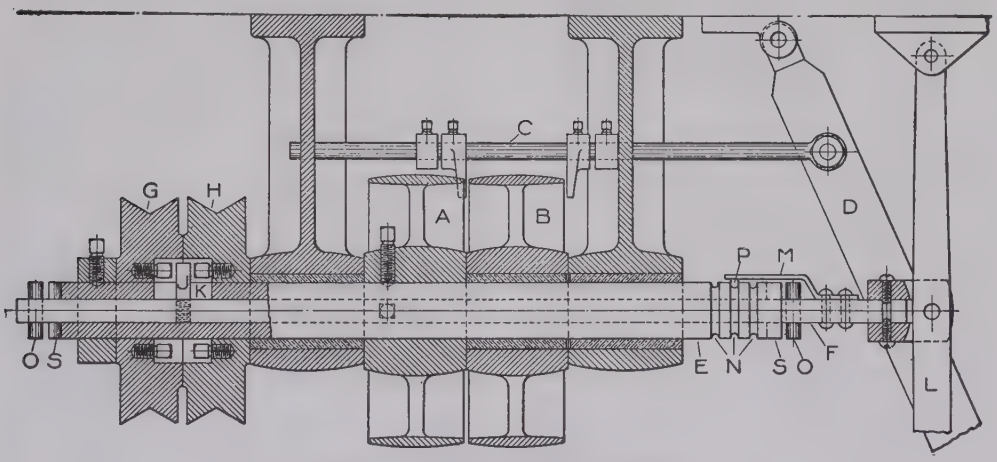
The shape given can be used in revolving shafts from 1 to 6 in. in diameter without damaging the keyway. It is made of ½ by 1-in. steel.

¶The best grinding abrasive for gas engine valves can be quickly made by pounding or grinding common glass to the consistency of wheat flour and using with water or oil.

Countershaft for Driving Two Separate Machines

Countershafts are usually made to drive only one machine, but the one shown in the accompanying sketch was designed to drive a small lathe and drill press separately. While the countershaft is very light in this instance, the design can be varied somewhat to suit the shop conditions and the size of the machines to be run.

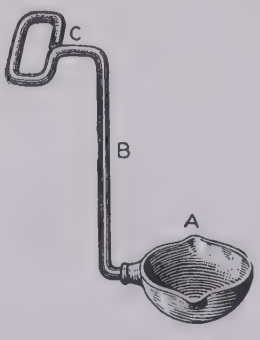
A and B are the tight and loose pulleys. The belt is moved from one to the other by means of the belt shifter, C, and the hand lever, D. The tight pulley, A, is fastened to the hollow shaft, E, by means of set screws. This hollow shaft has a smaller shaft, F, running through its center as shown. G and H are the two driving pulleys and are belted to their respective machines. The inner shaft, F, has a pin, J, fastened in it which projects through a slot, K, in the hollow shaft, E. The driving pulleys are bored out on the inside and have several set screws fastened in them as shown. When the shaft F is moved either to the right or to the left, the pin J catches on the heads of the set screws and turns the pulley. The shaft F is shifted by means of the lever L. The spring M has a small projection, P, fastened to it which drops into the grooves N and holds the shaft in the proper position. The end pins, O, are fast in the shaft F and fit into the slots S in the end of shaft E and help to bind the two shafts together. The sketch shows the pin J in the free position. The lever L has only to be shifted to the right to drive pulley H and shifted to the left to drive pulley G. This little device is very useful in small shops where the machines are small and the overhead space limited.—Contributed by Gilbert Parker, Charlestown, Mass.



Details of a Double-Driving Countershaft

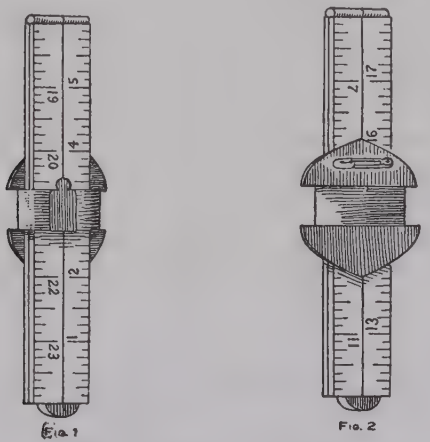
Melting Babbitt in a Common Stove

The accompanying sketch shows the construction of a babbitt ladle for use in a stove. In the sketch, A represents the ladle cast with double lips for pouring from both sides; B is a wrought handle screwed in A and bent so as to reach down into the fireplace of a stove. The loop C is made broad so as to control the pouring of the metal.—Contributed by C. Purdy, Ghent, O.



A Pocket Rule Holder

The mechanic is often annoyed by having a rule slip from his pocket when bending or stooping over, and many times this will cause the loss of a good



Rule in the Sheet-Metal Holder

rule. When a rule is carried in any other pocket except the special rule pocket in the trousers it should be protected with some kind of a holder. Such a holder as shown in Fig. 1 can be made, from a piece of heavy sheet tin or brass. A safety-pin is soldered on the upper side of the back (Fig. 2) and a piece of elastic, ¾ in. wide, is placed around the plate in the slots, and the rule is placed between the plate and elastic. There is just enough friction to hold the rule firmly. Sew a piece of leather or fasten a piece of metal on the top side of the elastic to stretch same for inserting the rule.—Contributed by E. E. Stanton, Huntington, Massachusetts.

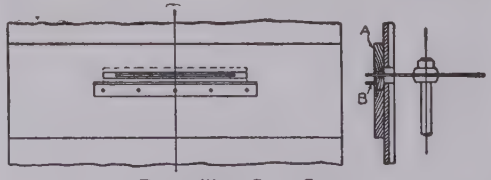
Stretching a Tight Fitting Shoe

A new shoe does not always fit the foot and when a stretcher is not at hand the following method will do equally as well: Place your foot on a 1-in. board, draw an outline of the foot, and saw out the pattern with a turning saw. Cut this out the same as a last and round off the corners so it may be used for either shoe. Round off the ends of some sticks that are ⅜ by ¾ in. and about 1 ft. long and drive them in on top of the last. Put in as many sticks as possible and wet the leather. Allow the shoe to stand over night with this last applied and usually the leather will be stretched enough to fit the foot nicely. A second operation may be necessary.—Contributed by J. A. Johnson, Walla Walla, Washington.

How to Dovetail on a Rip Saw

The small jobbing shop is sometimes called upon to turn out dovetailed work, and as these jobs are few it does not pay to have a dovetailing machine. A rip saw is one machine any small shop must have and dovetailed work can be done on it providing a device is supplied to the saw table top as illustrated.

Clamp or screw a board (A), about 12 in. wide and of suitable length, to the table top. Run the saw up through this board so that it projects above about ⅜ in. A brass angle (B) is set in the board with the one leg projecting above about $\frac{5}{16}$ in. This angle leg should be a trifle thinner than the width of the saw cut and placed the same distance away from the saw. The holes for the screws in the angle leg can be slotted to regulate this distance. Patterns, for rings with only one layer of segments, dovetailed on this machine, will be found to be very strong. The operator first holds the piece against the angle leg and cuts the first slot by pushing the wood on

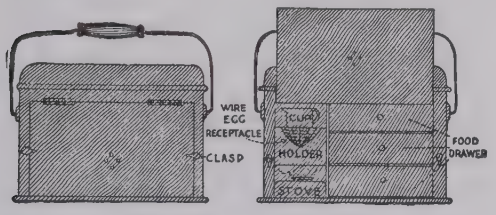


Dovetailing Saw Gauge

the saw, then the saw cut is placed over the leg of the guide and the next one cut on the saw and so on. Boxes and many other articles may be dovetailed in this manner.—Contributed by E. W. Mason, Minneapolis, Minn.

Cold Weather Lunch Pail

The use of the pail illustrated in the accompanying sketch makes it possible for a workman to have a warm lunch at the noon hour. Anyone knowing how to handle sheet tin can make this pail, or you may have it made by a tinner. The contents are taken from the side instead of the top as in the ordinary kind. A door is provided with hinges at the top and clasps at the ends. The interior is divided into two parts, one for food drawers and the other for coffee. The coffee holder is supplied with a cup to keep the liquid from splashing over. At the top of the holder is a wire mesh shaped like a cup where an egg can be placed without its dropping to the bottom of the liquid. Below the coffee holder is a



Cold Weather Lunch Pail

common alcohol lamp or stove which can be lighted in time to have the entire lunch warm by noon time.—Contributed by W. A. Jaquith, Richmond, California.

Temporary Repair on an Automobile Tire

When you are out on a trip with your automobile and get caught with a blow-out and with no spare covers on hand and you are a good many miles from a place to get repairs, you may possibly be obliged to try this substitute patch. If you do not have the necessary repairing material on hand, take an ordinary shirt cuff and insert it underneath the rent in the tire cover and inflate the inner tube. The cuff has the stiffness and pliability necessary to answer the purpose, and has been worked several times with gratifying success.

Holding a Barrel on a Truck

The accompanying sketch shows a chain and hooks attached to a truck for holding a barrel while transporting

Hooks in the Barrel

it from place to place. Two pieces of chain are used, one 4 ft. and the other about 2 ft. long, which are connected together with a hook to form a Y-shaped figure. Two hooks are made like the one shown in Fig. 1 and attached to the two shorter ends of the chains. These are hooked into the barrel just below the first hoop as shown. The other end of the chain is fastened to a bar placed behind the standards of the truck.—Contributed by W. Armstrong, Springfield, O.

A Close-Fitting Caliper Joint

A caliper joint that will always work snug and be properly lubricated is shown in the sketch. The caps or washers, AA, are made concave as shown at BB between the rivet C and the outer edge of the disk. The concavity is filled with beeswax before the

Joint Filled with Beeswax

parts are put together and riveted. The rivet C can be quite large, and after it is riveted down, a hole, D, is bored through the center.—Contributed by C. Purdy, Ghent, O.

Digging and Filling Trenches with a Steam Shovel

The accompanying illustration shows a 35-ton revolving steam shovel digging a ditch 4 ft. wide and from 10 to

Tile Ditching with a Steam Shovel

14 ft. deep, and at the same time filling the trench behind, while the tile are being laid beneath the machine. The back filling is accomplished by excavating in front, swinging through a half circle and depositing the material in the trench after the tile has been laid.

Fighting Mine Fires with Sulphur Dioxide

Stubborn mine fires have been quenched by producing an atmosphere in which combustion cannot be sustained. Carbon dioxide has been tried with a fair degree of success to produce this atmosphere. The cost of producing carbon dioxide and the danger of forming carbon monoxides make a decided drawback to the use of this method. Sulphur dioxide is more efficient than carbon dioxide in putting out a fire, yet it has not been tried out in combating mine fires. No combustible material can possibly burn in an atmosphere containing any considerable quantity of sulphur dioxide. Sulphur dioxide is very heavy, being almost twice as heavy as carbon dioxide and this heavier weight of the sulphur dioxide is an element which leads to increased efficiency, since the readiness at which the air present in the interstices of a pile of burning coal will be displaced by any inert gas is dependent upon the density of the gas. Another important effect of the greater density of sulphur dioxide is that its cooling effect upon a bed of incandescent coal is greater, volume for volume, than would be the case with a less dense gas.

Sulphur dioxide is much less dangerous than carbon dioxide as no explosive lower oxides can be produced in the reduction. Another danger of carbon dioxide is that men will get into the gas without knowing it and suffocate, where if sulphur dioxide is used, the strong odor gives instant warning when a fraction of 1% of the gas is in the air. This odor also makes it possible to locate any leakage, which can be immediately stopped before a great amount of gas has escaped.

The extremely simple manner in which sulphur dioxide can be produced, the cheapness of the method, and the efficiency of the gas in putting out fires, seem to make this a desirable means of combating mine fires. The safety of the method, its convenience, and its utility in showing fissures, which allow the escape of gas and ingress of air, are also strong points in its favor.

A Chisel for Squaring the Ends of Mortises

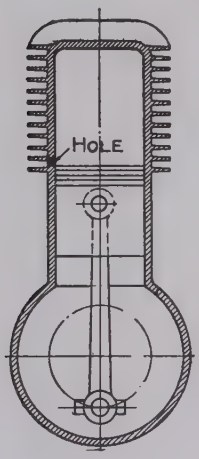
Take an ordinary socket chisel and grind the edge a little concave, as shown in the illustration. This will

For Cutting Corners Square

make it easy to cut the bottom ends of mortises square, as well as squaring the sides.—Contributed by C. Purdy, Ghent, O.

Increasing the Power of a Motorcycle Engine

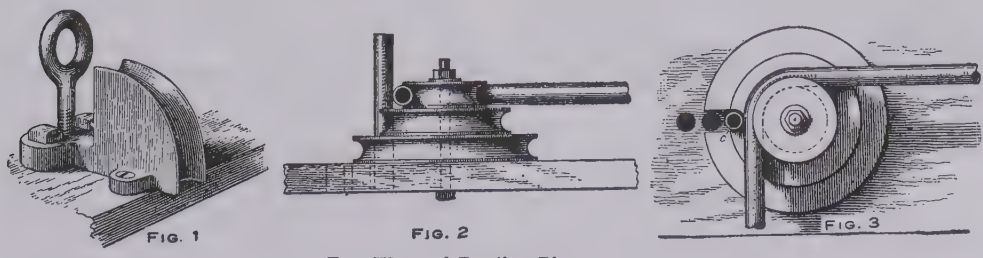
Most motorcycle engines are designed with the exhaust outlet too small to work efficiently. This fault can be overcome if a hole is bored as shown in the illustration. Bore the hole in the cylinder casing so that the piston just uncovers it at the bottom of the stroke. This allows a part of the burnt gases to escape, making less work for the engine to expel them at the exhaust port There is little, if any, gas escapes on the induction stroke as the gas is not under pressure until the piston has started on the return stroke and has closed the hole. The burnt gases, however, being under pressure, rush out of the hole as soon as it is uncovered by the piston on the power stroke. A ¾-in. hole is about the right size. A muffler can be attached if desired, but it will decrease the efficiency of the hole.—Contributed by A. H. Ashton, Pomeroy, Ia.



Pipe-Bending Tools

Two forms of bending tools which are applicable for bending welded butt-jointed and seamless tubing are shown in the illustrations. A simple tool for bending quarter turns is shown in Fig. 1. This tool is forged from a piece of steel and fitted with an eye-bolt at the back to hold the pipe while making the bend.

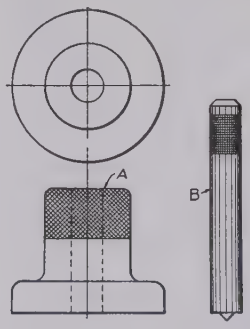
In Fig. 2 is shown the side and Fig. 3 the top view of a bending tool made from old pulleys, which are bolted together on a bench or plate. The pulleys are cut on one side to clear the holes in the bench for the catch pins. Different sized bends can be made around the pulleys. Do not forget that the pipe must be filled with sand before making the bend. When bending pipe in spirals or continuously, fill the pipe with lead and melt it out after the bend is made. Brass and copper tubing should be filled with rosin before making the bend.



Two Ways of Bending Pipe

Tool for Enlarging Center Punch Marks

In laying out a series of holes it is a difficult task to make a punch mark large enough to start a drill and also keep it central with the laying out lines. This is especially true when the holes are so small that they cannot be laid out by drawing a circle with a divider.

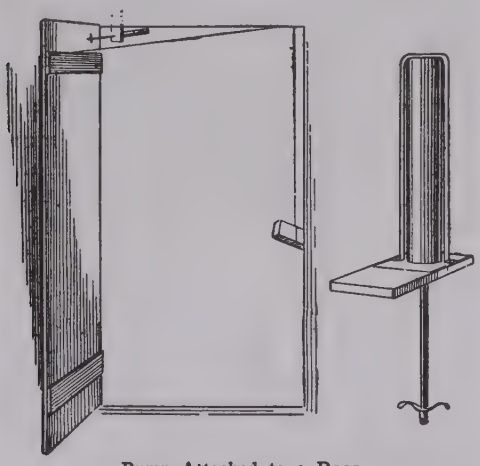


The accompanying sketch shows a simple little tool for enlarging the center mark and also keeping it exactly central. Locate your center by making a very small dot with a prick punch or scriber. Now place the punch B in

the holder A letting it extend through far enough so you can see when the point is centered on the small prick punch mark. Drop the holder A until the base lies flat upon the work and while holding it securely hit the punch B a blow with a hammer. This will enlarge the center mark and also keep it central with the first one.—Contributed by Chas. E. Klink, Lemoyne, Pa.

A Barn Door Check

An old bicycle pump that is no longer of use as a tire inflator will make a good door check. The vent is almost



Pump Attached to a Door

closed with a piece of paper or wood so that the air confined will pass out slowly, thus holding the door in check. The pump is held in position with a strip of leather or canvas attached to a piece of tin which is fastened to the door frame. The end of the plunger is tied to the top of the door.—Contributed by Thos. De Loof, Grand Rapids, Mich.

Mission Stains

What is mission oak stain? There are many on the market, with hardly two alike in tone. The true mission oak stain may be said to show a dull gray, the flakes showing a reddish tint, while the grain of the wood will be almost a dead black. To produce such a stain take 1 lb. of drop black in oil and ½ oz. of rose pink in oil, adding a gill of best japan drier, thinning with three half-pints of turpentine. This will make about 1 qt. of stain. Use these proportions for a larger quantity of stain. Strain it through cheesecloth. Japan colors will give a quicker drying stain than that made with oil colors, and in this case, omit the japan and add a little varnish to bind it.

One of the most popular of all the fancy oaks has been that known as Flemish, and this in spite of its very somber color, says Wood Craft. There are several ways of producing Flemish finish; you can fill the wood with a paste filler stained with raw umber, and when dry apply a stain of transparent flat raw umber, and for the darker shades of finish use drop black with the umber. Varnish and rub down.

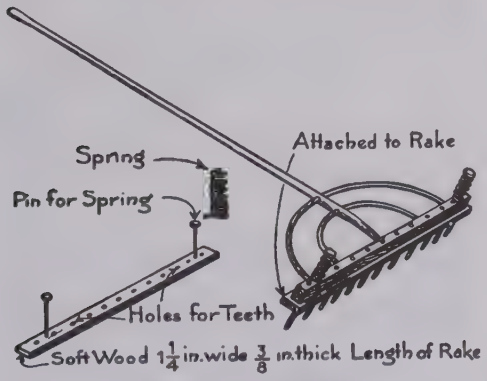
According to a foreign technical journal, French workmen mahoganize various kinds of woods by the following method: The surface of the wood to be stained is made perfectly smooth. Then it is given a coating of dilute nitric acid which is rubbed well into the wood fiber. Then it is stained with a mixture made by dissolving 1½ oz. of dragon's blood in a pint of alcohol, this solution being filtered, and then there is added to it one-third of its weight of sodium carbonate. Apply this mixture with a brush, and repeat the coats at intervals until the surface has the appearance of polished mahogany. In case the luster should fail, it may be restored by rubbing with a little raw linseed oil. The description of the process is meager, and hence he who would try it will have to experiment a little.

A good cheap mission effect for oak is to mix together equal parts of boiled linseed oil and good asphaltum varnish, and apply this to the wood with a brush; in a minute or so you may rub off surplus with a rag, and when dry give a coat of varnish. A gallon of this stain will cover about 600 sq. ft. of smooth surface.

SHOP NOTES

Self-Cleaning Lawn Rake

When cleaning a lawn of dead grass, leaves, etc., with a garden rake much time is lost in removing the trash clogged between the teeth. I was using a wood back rake for this purpose and decided to make an attachment for self-cleaning. I procured a soft and light piece of wood, 3/8 in. thick, 1¼ in. wide, and as long as the rake bar, and bored holes in it to match the teeth of the rake. Attached to this piece of wood were two pins which passed through the back of the rake. Two compression springs placed on these pins between their heads and the rake back kept the strip of wood at the base of the rake teeth. If the grass or leaves would stick to the rake teeth after each drawing of the rake, all that was necessary to do to clean them was to turn

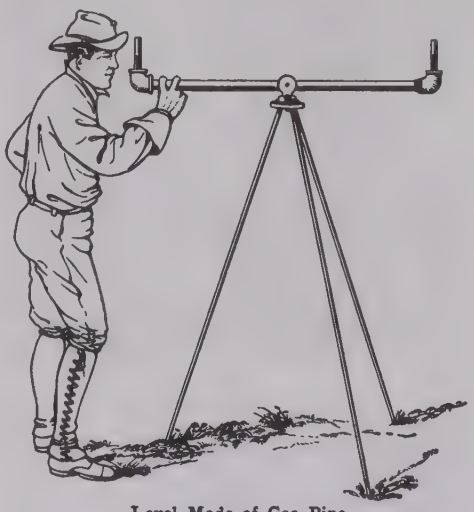


Cleans the Rake Teeth

the rake over and strike the heads of the pins on the ground. The teeth would be cleaned instantly.—Contributed by John Blake, Franklin, Mass.

A Home-Made Surveying Level

A good practical level for use in surveying the ground when laying drain tile can be made from a piece of ½-in. gas pipe and two ells, each fitted with a piece of water gauge glass. The pipe should be about 4 ft. long, to the middle of which is attached a socket



Level Made of Gas Pipe

for the tripod or support. When the level is set up the pipe is filled with water so the water level will be about one-half way in each glass. The surveying is done by sighting over the two water surfaces.—Contributed by Thos. L. Parker, Olaf, Iowa.

Velvet Grip for a Thumb Tack

A small piece of rubber cut from a rubber band about 3/8 in. wide and used as a washer on a thumb tack as illustrated will be found advantageous in many cases. In mechanical drawing it affords a firm grip on the paper and allows a slight space between the head of the tack and the paper which is most convenient in removing the tack. For tacking drawings, pictures, etc., to the wall, this rubber attachment will be found invaluable.—Contributed by C. W. Neiman, New York City.

A FORGE FOR PROSPECTORS

The experienced prospector, of course, knows that he needs a reliable forge, and after several years' trial I

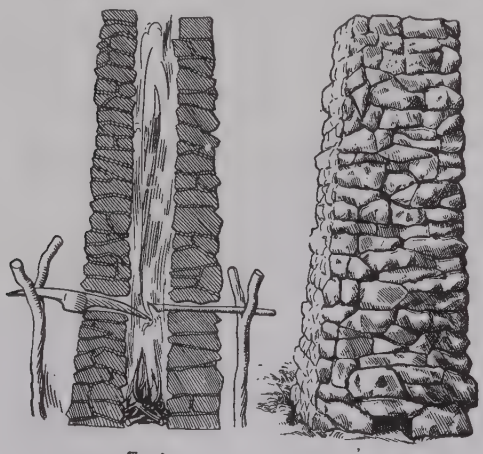


FIG. 1 FIG. 2

Forge Made of Rock

find the one illustrated and described herein to be the most satisfactory. All forges are too clumsy or too complicated and heavy to carry around. I once carried one on my burro for months without having any chance to use it, yet when one is needed it must be had immediately.

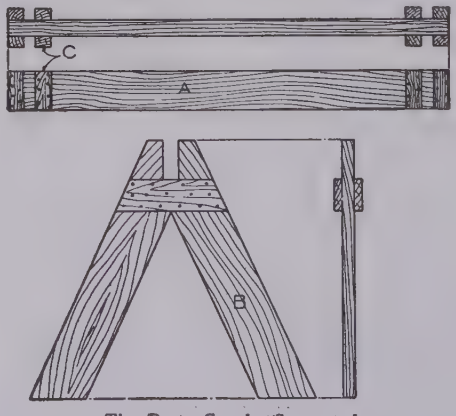
The one illustrated can be made on the spot out of stones, using mud for mortar, while a large granite cooking spoon makes an excellent trowel. This forge is simply a small chimney about 4 ft. high. The flue is 6 in. in diameter. At the bottom is left an opening through which to rake out the ashes; also to start the fire and give it a draft. A flat stone will serve as a door and to regulate the draft. If it does not fit snug enough, the edges may be sealed with mud. About 1 ft. from the bottom, four small holes are made just large enough to insert the drill and pick points. The forge is fed from the top, using wood broken into chunky pieces, charcoal or pieces of bark for the fuel, which must be well packed in the flue until it is about one-third full.

A piece of light railroad iron about 4 in. long serves well for an anvil. The best way to temper drills and picks after repointing them is to heat the metal to a cherry red, then dip ½ in. of the point into cold water, and hold it there for three or four seconds. Remove and place the point or cutting edge against a piece of newly broken green bark or green wood, and keep it there until it smokes. Then plunge the entire tool into water and let it remain until cold. Straw color is the best temper for drills to be used in ordinary rock.—Contributed by W. A. Lane, El Paso, Texas.

A Knockdown Shop Horse

A new design of a shop horse or trestle that can be taken apart for storing away or moving is shown in the accompanying sketch. If it is well made, it will be quite stiff and suitable for most any kind of work.

The top bar, A, is provided with grooves near each end formed by nailing strips of wood, C, on each side as shown. Each pair of legs has a space at the top which is a close fit over the top bar and the strips on the top bar are a close fit on the upper end of the legs. This horse is very handy for carpenters on account of its knockdown feature, for it is certain that the



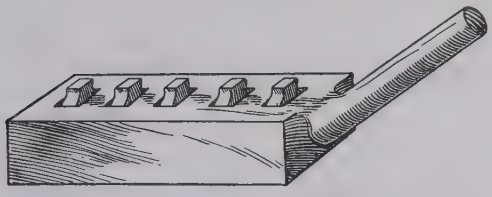
The Parts Can be Separated

old style of horse is very unhandy to stow away when not in use. —Contributed by J. R. Weaner, Plainfield, N. J.

A Stencil Block

In boiler shops and plate mills where it is necessary to stamp numbers on steel plates a device for holding stencils in a convenient manner has long been wanted. Plates for government work and marine boilers must all be stamped with a number representing the tensile strength of the material. In the mills where the plates are rolled every plate is stamped with the number of the heat from which the metal was poured. Quite often it is necessary to stamp the same number fifty or one hundred times. If this number contains four or five figures it means a great deal of work if the stencil man stamps the figures one by one.

The block shown in the sketch can be held by the operator while he strikes the stencils consecutively with a hammer. The holes in the block are large enough to allow the stencils to fit loosely. The bottom of the holes

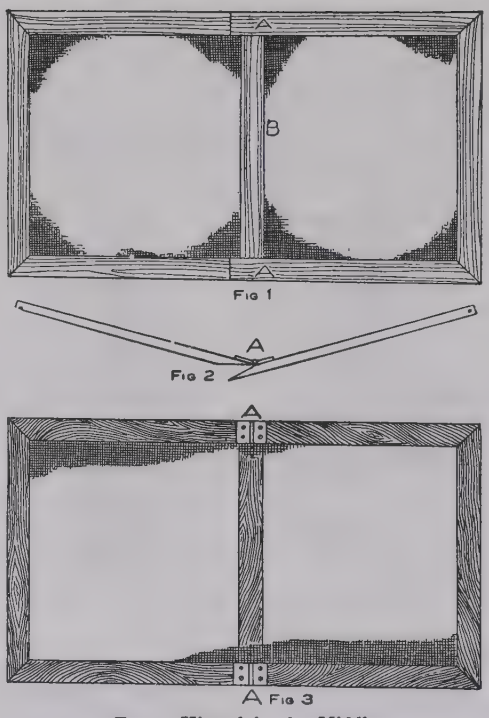


Block for Holding Steel Stencils

taper to a small size to prevent the stencils from falling through.—Contributed by J. J. O'Brien, Buffalo, New York.

Folding Window Screen

The accompanying illustration shows a window screen frame that may be set in the stile where the ordinary sash raises. The frame is built up the same as the ordinary kind, with the length equal to the width of the window sash, as shown in Fig. 1. The frame is then cut in the middle and hinges are put on as shown in Figs. 2 and 3. This makes it possible to set the frame in under the raised window sash. The brace B is put in to keep the sash from sagging. A screw hook

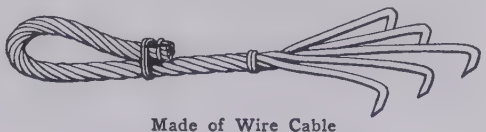


Frame Hinged in the Middle

and eye is put on the opposite side of each hinge to hold the frame rigid when it is in place. The outside of the frame is shown in Fig. 3.—Contributed by J. Long, Portland, Ore.

A Garden Weeder

Take a piece of wire cable having five or more strands of wire and untwist one end for about 3 in. Spread the strands out and bend the end of each one at right angles, making the bend about ½ in. long. Bend the untwisted end of the cable so it will be double for 6 in. of its length, and tie them together. Also tie around the



Made of Wire Cable

cable at the base of the hooked strands. The illustration needs no further description. — Contributed by R. H. Workman, Loudonville, O.

Double-Acting Gate Latch

The illustration shows a latch for a large driveway or farm gate which

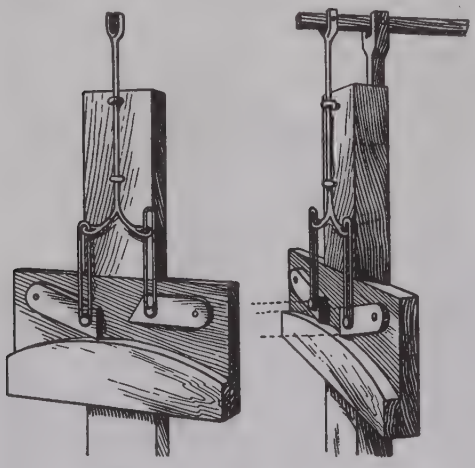


FIG. 1 FIG. 2

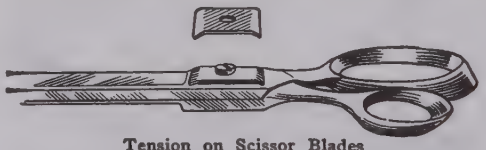
Latches Raised Singly or Together

combines the best qualities of different models of gate latches, and has an attachment by means of which it can be easily opened by a person on a horse or on foot. It is made by taking a board about 6 by 12 in. in size and nailing it to the gate post. A strip beveled off each way, Fig. 1, is then nailed on the lower end of the board and two catches of either wood or iron are bolted on above the strip, so it will move up and down easily. Attach a tongue on the gate that will extend out far enough to engage in the catches, as shown by the dotted lines in Fig. 2. This illustration also shows how the attachment for opening the latch is applied. The two catches are attached to the rod leading to the handle of this device by wire loops in such a manner as to permit each catch to operate independently of the other when the gate is swung shut from either side.

The latch can be adapted to a gate which swings only one way by making but one movable catch instead of two, and having a stationary catch or block in the place of the second catch. In this case the rod or device for lifting the catch may be attached directly to the catch without using the wire loops. It is best when making the latch to mortise the latch board into the gate post so that the gate will close up without leaving a large space between it and the post.—Contributed by J. G. Allehouse, Avomore, Pennsylvania.

Keeping Scissor Blades Tight

Remove the pivot screw from the scissors by filing down the riveted end of the screw. Secure a piece of clock spring about 1½ in. long, punch or drill a hole in the center for the pivot screw and bend the ends as shown. Procure a screw and nut the same size as the one removed. Assemble the parts with the spring on the screw. Tighten the screw until the proper tension is secured and rivet the end of the screw over the nut to keep it from turning loose. The spring keeps

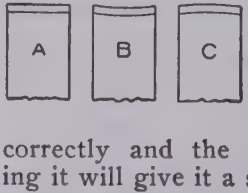


Tension on Scissor Blades

the blades at the proper tension without binding and consequently the edges remain sharp much longer. —Contributed by John Sedelmaier, La Salle, Ill.

How to Grind a Chisel

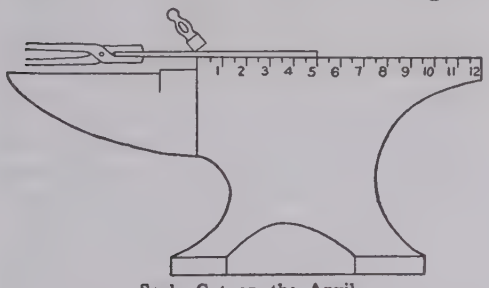
The experienced blacksmith upon receiving a chisel to be redressed always judges the user by the shape of the cutting end and gives it a temper accordingly. A chisel ground straight across or concave as shown at A and B, is ground incorrectly and the blacksmith receiving it will give it a slightly softer temper than he would the one ground convex as shown at C, which is the correct way to grind a chisel. When ground as shown at A and B, the points



do most of the work, and the smith must temper them somewhat softer so they will turn over slightly and not break off at the first blow of the hammer. A convex end makes the center the strongest part and as it is less liable to break, the chisel can be given a harder temper.—Contributed by D. A. Hampson, Middletown, N. Y.

Anvil Scale

A very convenient scale for blacksmiths can be made on the anvil as shown in the sketch. The lines are cut with a chisel, making the inch division marks 1 in. long and the ½-in. marks just one-half as long. The numbers can be put on with steel numbering punches. This will make the scale just where it is used most, and being on

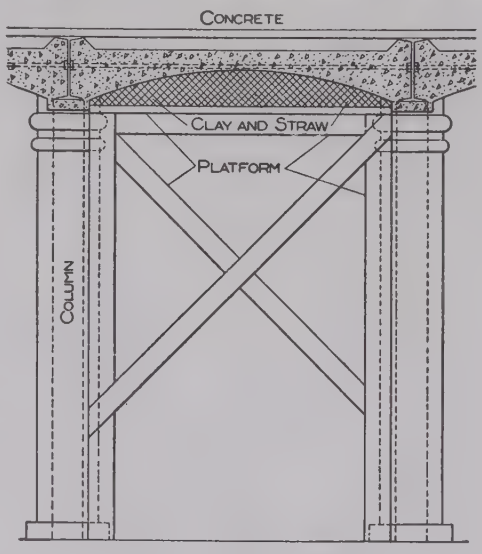


Scale Cut on the Anvil

the anvil, both hands can be used for holding the tongs and hammer.—Contributed by J. W. Plemons, Circleville, Ohio.

Clay Forms for Making Concrete Arches

Wood forms for making cement vaulted ceilings are very expensive as the material for constructing them is so cut up that it cannot be used for other purposes. This caused contractors who had a series of vaulted ceilings to make to try out using a clay and straw mixture on which to place the cement. The idea proved a success and they made flat platforms on which the clay and straw were rounded up to shape the vaulted ceiling. The cement was mixed and placed on the clay forms. The accompanying sketch shows a section through the center of one arch. When the cement had set



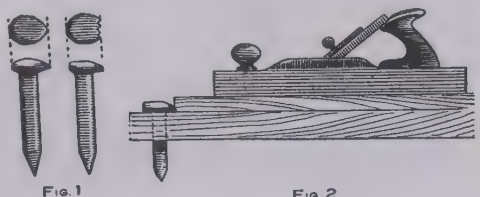
Clay and Straw on Platform

and the forms had been removed, the clinging clay was washed away with water from a hose.

Such forms could be used in many places where wood forms, on account of cost, are prohibitive.—Contributed by Walter A. Weldon, Rochester, New York.

Stop for a Workbench

Where only thick lumber is planed on a bench, a good stop can be made from an ordinary railroad spike. The overhanging head of the spike should be filed sharp and straight, and then saw-tooth notches filed in this sharp edge as shown in Fig. 1. The spike is

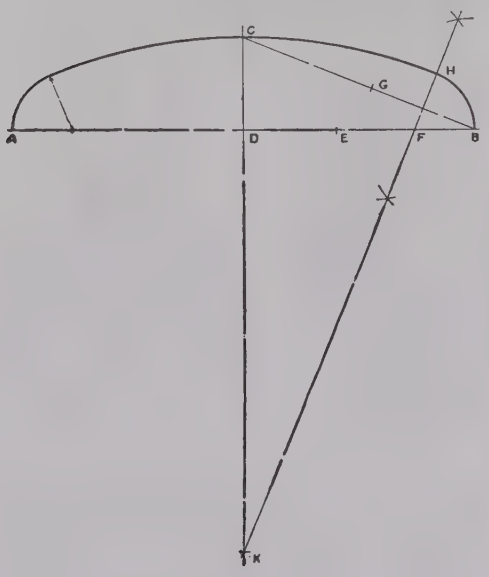


Railroad Spike Stop

then driven through a hole bored in the top of the bench as shown in Fig. 2. The height can be adjusted as desired.

Laying Out an Elliptic Arch

A simple method of laying out an elliptic arch is shown in the accompanying sketch. This will prove use-



Layout for Arches

ful to carpenters and others who have occasion to make supports for window heads, doors, and concrete arches.

In the sketch, AB is the width and CD the height of the arch. Lay off DE equal to CD. Draw line CB and from the point C lay off CG equal to EB. Now draw a line perpendicular to and bisecting the line GB and intersecting the center line at K and the line AB at F. Then KC will be the radius of the large arc and FB the radius of the small one with K and F their centers. Draw the arcs and the elliptic arch will be completed.

Arches can easily be duplicated by laying off a rod KFH and driving nails at the points K, F and H and using K as a center describing the arc CH and with F as a center describing the arc HB. If a board is to be bent by saw kerfs this is also handy as two centers are given and one can proceed as if making two segments with H as the intersecting point.—Contributed by Alfred Atherton, Philadelphia, Pa.

Weighing Stone on Barges and Scows

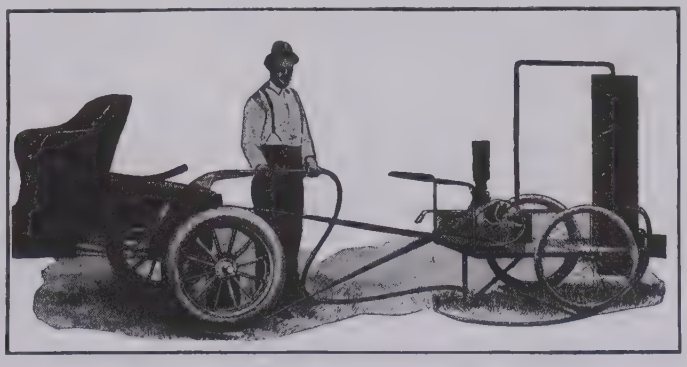
The following is a description of the methods employed to ascertain the weight of stone shipped on barges and scows from the quarries. The fleet consisted of several old schooners that were converted into stone carriers, common deck scows and steel derrick scows. As it was not practical to weigh all cargoes on the scales the following methods were used: Usually the boats were "weighed in" once each season, sometimes oftener. The stone was actually weighed on scales and then placed aboard the boat. The water displacement was closely watched at various times during the loading. Markings were made fore and aft on the outside of the boat at the water line, making lines for different weights. As this method of markings did not prove satisfactory another way of gauging the displacement was adopted. This plan was to bore a hole in the bottom of the boat. In this hole was fitted tightly a 3-in. pipe having sufficient length to extend almost to the deck. The water had free access to the inside of the pipe. Two holes were made in the side of the pipe and short pipes fitted with a throttle. A glass tube was inserted in these two pipes and when the throttle was opened the water showed in this gauge similar to a water gauge on a boiler. A rod was fastened firmly near this pipe and cross lines 0.01 ft. apart were drawn on it. The feet were marked in large red numerals and tenths of a foot in smaller black numerals. The gauges were read before any cargo was placed on board. Then 50 to 100 tons, according to the size of boat which had been weighed on the scales was placed aboard and the gauges again read and the displacement noted. This reading of the gauges was repeated at various times during the loading of the barge, the displacement always being noted. The displacement for any amount of tons was found from the various gauges, two to six, according to the size of the boat, being read and their average found. Before any cargo was placed aboard

the reading was called the light gauge reading. Then after a part or all of the cargo was aboard the gauges were again read and their average taken. From this last average the first was taken, the difference being the displacement. The gauges were placed fore and aft only, in the smaller boats, near bow and stern, and as near the keel as possible. In larger boats there would be one gauge fore, one midship, and one aft, and in the largest boats there was a gauge at the fore, one midship, and one aft, all on starboard side, and one opposite each of these gauges on port side, or six in all.

After the weighing in of a boat was satisfactorily completed, tables were compiled from the various gauge readings and their corresponding tonnages and these tables were used for computing the future loads of this boat. These tables were computed for every 0.005 ft. displacement from the lowest probable loading to the highest. After a boat had been satisfactorily weighed in, all that was necessary to ascertain tonnage of a load was to read gauges before loading, then place entire cargo and read gauges again, deduct former from latter and refer to table.

Vacuum Cleaner Driven by an Automobile

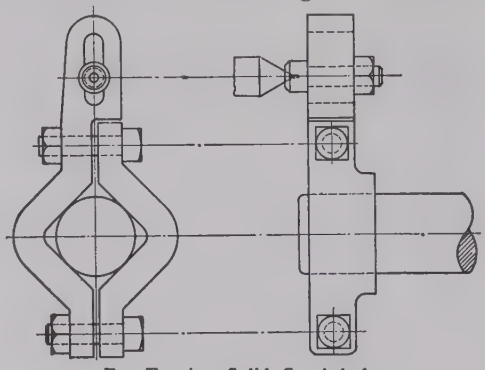
Many times automobiles have lent themselves to various purposes besides traveling the roads as a pleasure car. In one instance a light car was used to drive a home-made vacuum-cleaning outfit at a country home where no electric power was available. The air pump was purchased and attached to a dust tank made from an old water tank. One rear wheel of the automobile was raised from the ground and a belt placed on over the pneumatic tire to drive the pump. The complete outfit cost considerable less than a factory made outfit and performed just as effective work.—Contributed by L. H. Jacks, Albany, Oregon.



Automobile Driving the Vacuum Pump

Jig for Turning Crankshafts

Almost every machine shop of any size has some sort of a jig for turning crankshafts. Some are good and some

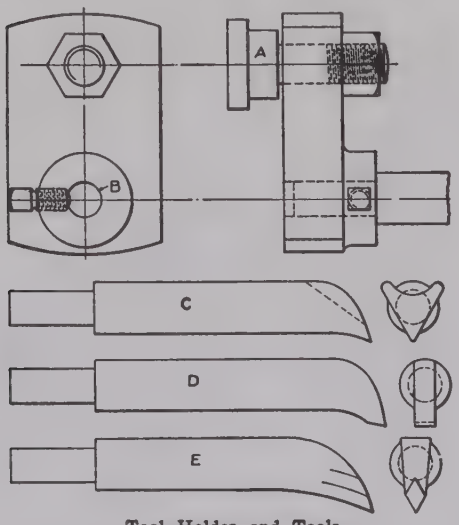


For Turning Solid Crankshafts

are not, but the one shown in the accompanying sketch has been in use for some time and has given good satisfaction. It is very simple and easy to make and has the advantage of being adjustable so that cranks of different throws may be turned on it. All the parts are made of steel and the center should be hardened. The castings should be proportioned according to the size of crankshafts they are to be used in turning. Two sets of castings will be required, one for each end of the crankshaft.—Contributed by R. T. Traylor, Suffolk, Va.

A Tool Holder for the Shaper

A tool holder for the shaper, which is very useful on die work and all internal shaper work, is shown in the ac-



Tool Holder and Tools

companying sketch. The body is made of cast iron and the lock bolt of steel. The lock bolt should be made to fit the tool post hole in the shaper head block. The width of the body piece should be a little less than the width of the block and it should be about 2 in. longer. The tools fit into the hole B and are held by a setscrew. They are made of drill rod and can be of any desired shape or length as shown by C, D and E. They should be turned down at the end to prevent them from slipping through the hole B.—Contributed by M. S. Fehlman, Arlington Heights, Ill.

Moving Storage Boxes Easily

Parts of machinery, supplies, castings and such things, usually kept in boxes or sets of drawers on the floor and under a workbench or table, make a heavy load to move about when some part is wanted. These bins or boxes can be easily moved if a ⅜-in. pipe or a ½-in. iron rod is placed under each one near the front. They can then be drawn out almost as if on wheels.

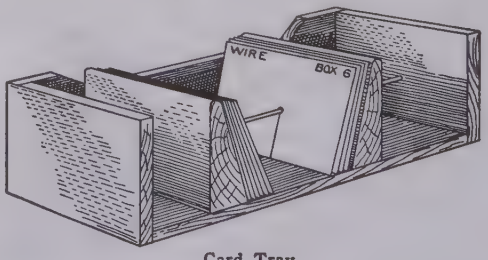
Card Index for the Shop

A card index system can be used to advantage for the shop just as well as in an office. Most shops are strewn from one end to the other with all kinds of working material and parts. These can be taken care of in the same way as papers are filed in an office, using a card system as shown in the accompanying sketch. This system will give the workman a means of locating each piece of material quickly.

A sufficient number of boxes, drawers with divisions or bins, are provided, each giving ample room for the part or parts, and numbered 1, 2, 3, etc. These numbers can be cut from an old calendar and pasted on the front end or edge of the box.

The filing case is made up of a hundred or more blank cards about 2½ by 4 in. in size. Take each part you wish to file away and write its name or description in the upper left hand corner of a card. Place the part in one of the numbered compartments and put its number on the upper right hand corner of the card. When all the cards have been filled out properly, punch a small hole ½ in. from the bottom edge and in the center of the card. Cut a slit from the edge of the card to the hole. This makes it possible to insert new cards in the case and remove the old ones for corrections, etc.

Make a wood tray to hold them a little larger than the cards. The tray should be 8 or 10 in. long and pro-



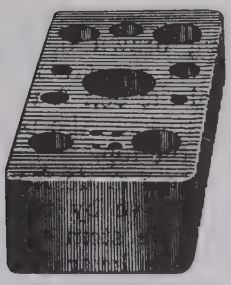
Card Tray

vided with a wire ½ in. from the bottom and in its center. Two tapered blocks are provided and put on the wire before it is fastened to the tray

ends. The tray as illustrated has one side removed so the parts may be clearly shown. When placing the cards on the wire be sure to put them in alphabetical order.—Contributed by C. A. Kotterman, Washington, D. C.

A Bench Block

One of the most useful tools I have on my workbench is the bench block shown in the accompanying sketch. It is made from tool steel, 1 in. square, with the corners rounded slightly, for appearance. A $\frac{3}{8}$-in. hole is bored through the center and at the four corners are drilled respectively $\frac{5}{16}$-in., $\frac{9}{32}$-in., $\frac{1}{4}$-in. and $\frac{7}{32}$-in. holes. Between these holes are spaced six other holes from $\frac{3}{16}$-in. to $\frac{1}{32}$-in. The block is hardened, tempered to a straw color and ground all over.

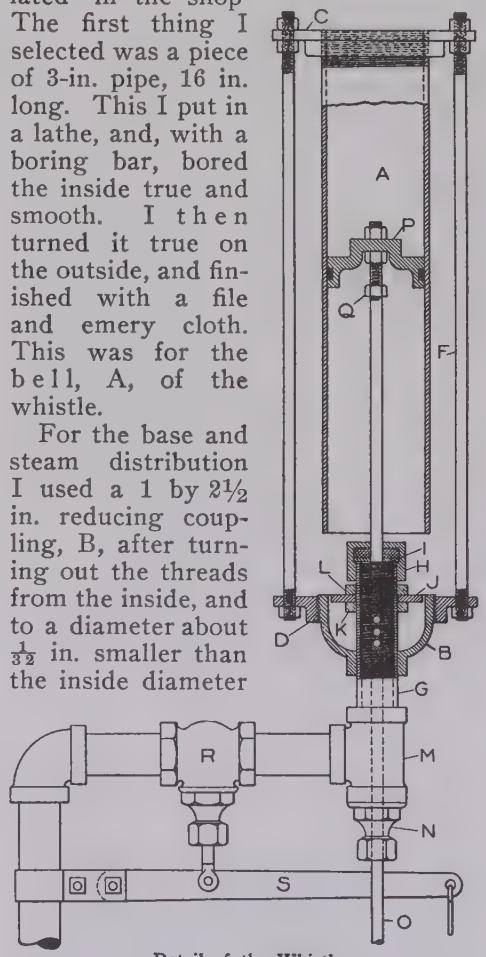


Some of the uses of this block are as follows: It serves as a good block through which to drive out pins, rivets and dowels. If the pins or rivets are long, it can be placed over the open jaws of a vise when used. The holes being of standard sizes it makes an excellent drill gauge. Another use is to punch holes through sheet metal up to $\frac{1}{16}$ in. thick. I have several round punches that correspond to the holes in the block. Locating the part to be punched over the proper sized hole, take the right sized punch and strike a light blow on the metal as near over the hole in the block as possible. If correctly located, in which case the metal will sink slightly into the hole, the punch can be easily driven through. If incorrectly set, the punch may be relocated and driven through. A little practice will save going to the drill press many times.—Contributed by Chester L. Lucas, E. Saugus, Mass.

How to Make a Mocking Bird Steam Whistle

While on a construction job I made at odd times, a steam whistle from old pieces of junk which accumulated in the shop. The first thing I selected was a piece of 3-in. pipe, 16 in. long. This I put in a lathe, and, with a boring bar, bored the inside true and smooth. I then turned it true on the outside, and finished with a file and emery cloth. This was for the bell, A, of the whistle.

For the base and steam distribution I used a 1 by 2½ in. reducing coupling, B, after turning out the threads from the inside, and to a diameter about $\frac{1}{32}$ in. smaller than the inside diameter of the bell, A. On the outside of this coupling I cut threads 8 to the inch. Two old pipe flanges were turned up in the lathe to make them as light as possible, one pipe flange, C, threaded to fit the top end of the bell and the other, D, to fit the threads cut on the outside of the coupling. As the 3-in. pipe had threads on one end these did not have to be cut.



Detail of the Whistle

The flanges were connected with three ½-in. bolts having sufficient

length to raise the bell from 1½ to 2½ in. from the diaphragm. These bolts were threaded long on one end for the purpose of adjusting the height of the bell. The drawing only shows two bolts, but three are necessary for correct adjustment.

The steam connection at the lower part is a 1-in. pipe, G, with a thread on one end long enough to reach entirely through the coupling, and have end enough to accommodate a lock-nut and a small stuffing-gland, H, which was made from the stuffing-nut of an old brass valve. The top of the pipe was covered with a washer, I, having a hole large enough to allow a ⅜-in. rod to pass through easily. The long threaded pipe was perforated, making the holes ¼ and $\frac{5}{16}$-in. in diameter inside of the coupling as shown. I then turned up a diaphragm, J, from thin metal, to a diameter of about 3/64 in. less than the inside diameter in the coupling B, and made a hole in it that the 1-in. pipe would pass through tightly. The 1-in. pipe was then screwed in position in the coupling, a lock-nut, K, turned on, and the diaphragm placed and set in position. Then another lock-nut, L, was turned on to hold them all tightly in place. Then the stuffing gland, H, was placed on top to complete this part of the whistle.

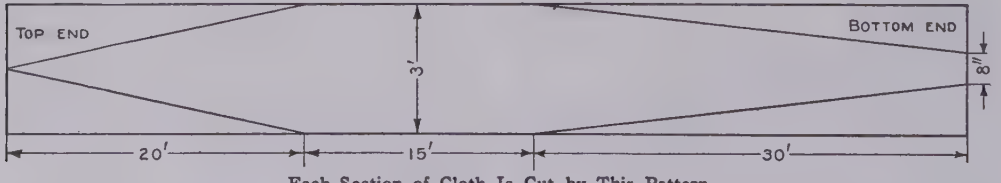
The steam pipe, G, was turned into a tee, M, which was fitted with a stuffing gland arrangement, N, made from an old brass globe valve, machined and fitted as shown. This prevents steam leakage around the rod O, which was made from ⅜-in. round iron and smoothed with emery cloth. The piston, P, was made from an old 3-in. pipe plug which was turned up and grooved for a cast-iron snap ring. The piston was fastened to the end of the rod O with two nuts as shown. The nut Q was placed on to prevent the piston from being drawn out of the bell by striking on the stuffing-gland. The top end of the bell A was hammered in slightly to keep the piston from going out at the top.

The steam valve R was made from an ordinary 1-in. disk valve by turning off the threads on the stem so it could be operated by the lever S as shown. The change of tone is caused by the piston moving up and down in the bell. The piston is operated by the rod O. This whistle has a range of three octaves and has a clear and beautiful tone which equals very expensive ones.—Contributed by Jack Campbell, Denver, Colo.

Aeronaut's Hot-Air Balloon—Part I

How to Make a Balloon

In November of the year 1782 Joseph M. and Jacques E. Montgolfier, sons of a paper maker of Annonay, France, conceived the idea of filling a light envelope with smoke to make it rise in the air. They lighted a fire, placed a large paper bag over it to collect the smoke, and were delighted to see the bag ascend. The brothers became joint inventors of the hot-air balloon, and in June, 1783, they made a public demonstration of their great discovery. The hot-air balloon is also called a montgolfier, in honor of the brothers. As aeronautics is a constant and ever prevailing topic, its latest developments being watched with increasing interest, the making and op-



Each Section of Cloth Is Cut by This Pattern

eration of the old-time hot-air balloon may prove to be of great help to many as an experiment.

The description and illustrations are for a balloon 42 ft. in diameter and 65 ft. high. This size balloon will carry a person weighing 170 lb. or less, also the weight of a parachute. The balloon complete and ready for filling will weigh less than 200 lb.

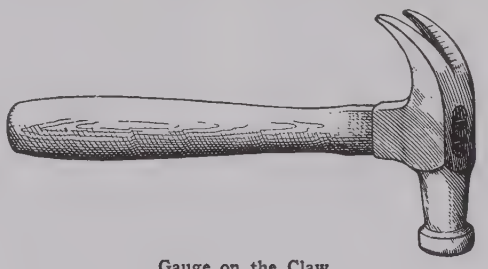
There will be needed 42 pieces of unbleached muslin, 3 ft. wide and 65 ft. long, or 910 yd. of cloth, 1 yd. wide, to make the main part of the balloon. A regular balloon maker would utilize the gores cut from the cloth for the top and bottom, but the full lengths are given as it is best for those not expert in balloon construction. Lay the pieces of cloth on top of each other carefully until there are six layers. Cut one of the pieces for a pattern, using the dimensions given in the diagram. This design is simple and will suit all purposes just as well as a more complicated diagram. The top part of the piece is cut to a point and the bottom left 8 in. wide so that an opening will be left for inflation after the pieces are all sewed together.

After the sections are cut, join them together by taking about ½ in. of the edge of each piece, laying them double and sewing on a machine with a strong thread, making a double fell. After all of the edges are joined together, double or turn the top ends through a strong ring that has a diameter of about 3 in. This ring is used for hanging the balloon while inflating. Turn up the bottom edge of the cloth and sew a ½-in. rope tightly inside of a hem. Fasten four ropes, each 12 ft. long, at equal distances apart on the rope ring. These ropes are used for carrying the basket, turning bar or parachute.

The balloon is strengthened with four bands of cloth, each one 3 in. wide, sewed around at equal distances apart. A double band with a small cord placed inside is sewed only on one edge about 5 ft. from the bottom opening. This is for holding the cloth out from the chimney when the balloon is nearly inflated. While it is not necessary, it is best to double the cloth for about 6 ft. around the top ring. Three light ropes about 65 ft. long are fastened to the top ring, and are used to steady the balloon during inflation.

Wire Gauge on a Hammer

A lineman will find it handy to have the claw of his hammer marked off as a wire gauge. This combination will

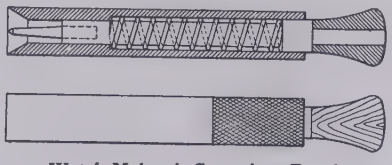


Gauge on the Claw

provide him with two necessary tools in one. The marks can be made by testing wires with a regular gauge and using them in the claw to mark the graduations. These can be numbered with steel numbering punches or etched with acid.—Contributed by F. D. Heiser, Biddeford, Maine.

A Centering Tool

A new tool which is used for accurately centering shafts is shown in the accompanying sketch. It can be made in various sizes to suit different kinds of work. Watch-makers will find it very handy in centering staffs that are to be drilled for new pivots. Machinists can use it to center shafting, hubs, or any round piece of work where the center must be accurate. The sketch

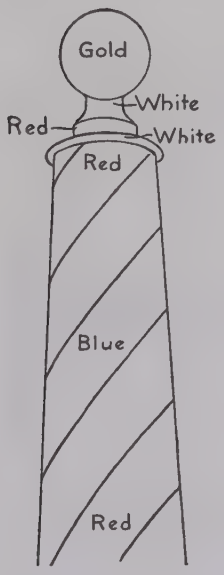


Watch-Makers' Centering Punch

shows its construction clearly and needs no explanation.—Contributed by F. W. Wieman, Lawrence, Kan.

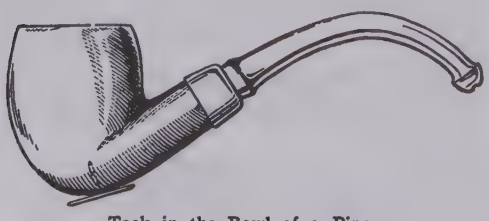
How to Paint a Barber Pole

First paint the whole pole a good solid white. Then secure some long strips of paper such as wall paper, as wide as the desired stripe. Make some good flour paste and paste the strips of paper on the pole, beginning at an angle of about 45 deg. Wind one of them around in a spiral until you reach the bottom. Start the second strip exactly opposite the first at the top of the pole. Paste this strip on in a spiral the same as the first one taking care to get the paper on even and to make the spaces the same. Give the paste time to dry. Then paint one open space red and the other blue, using the strips of paper in the same manner as a stencil. When the paint is thoroughly dry, dampen the paper and remove it. This will space the colored stripes correctly in a spiral.—Contributed by E. H. Tane, Oshawa, Ontario.



A Non-Upsetting Pipe

The smoker who wishes to lay his pipe down for a moment is frequently annoyed by having it upset and spill ashes and fire. Poker pipes with a flat bottom to the bowl overcome this trouble but the man who has a round-bottomed pipe generally likes it with all its faults and is averse to introducing a stranger to his mouth. A pipe may be made into a poker pipe by sticking into the bottom of the bowl a large flat headed thumb tack. The illustration shows a pipe thus equipped. If the right kind of a tack is not available, soldering a round piece of copper to a common tack is the work of a moment.—Contributed by C. W. Neiman, New York City.

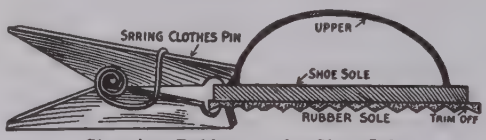


Tack in the Bowl of a Pipe

Attaching Rubber Soles to Shoes

Many floors in new factories are now made of cement. While such floors are durable and smooth for rolling trucks, barrels, etc., they are not so good for a human being to stand on during the working hours of a day. They put old age into a person's lower limbs rapidly.

This cement floor stiffness can be removed by attaching rubber soles to the regular leather shoe soles. Secure a piece of rubber, such as used for matting in an automobile, large enough to make two complete soles, a small bottle of rubber cement and a few spring clothespins. Clean the soles of the leather shoes, also the piece of rubber with a little benzine or turpentine. Apply the rubber cement to the piece of rubber and put them on the leather soles of the shoes. Press out as much of the cement as possible and clamp the spring clothespins on around the edge as shown in the illustration. Allow the cement about 24 hours' time to set, and then trim the edges.—Contributed by M. E. Duggan, Kenosha, Wis.



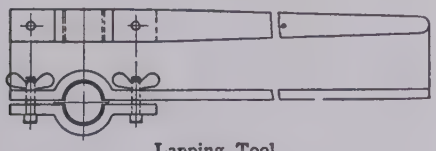
Clamping Rubber to the Shoe Sole

¶Unnecessary noise and wear of a chain will be prevented if it is kept clean and oiled.

A Tool for Grinding in Crank Pins

In overhauling and repairing automobile or marine gas engines, the crank pins are often found to be badly cut or worn, due to lack of proper lubrication and the subsequent overheating. In most repair shops all sizes and kinds of engines are met with and it would be considerable trouble to rig up a lathe with arms for centering cranks of different throws in each case to properly remove the scored marks by a machine tool.

The little device, shown in the accompanying sketch, for grinding or lapping in the crank pins has been used with good results. Take a piece of wrought iron, 5/16 by 1¼ by 20 in. long, and bend it as shown in sketch, likewise a piece for the under side. Drill two holes in them for bolts with thumb nuts for clamping them together. Caliper the crank pin to be lapped and then turn up a pin ⅛ in. less in diameter. Set the pin in a central position between the two bars and pour melted lead about it as you would to form a bushing. Split the lead so that the device can be clamped over the crank pin. By applying oil and emery dust to the inside and moving the handle laterally while the crank is revolved in a lathe, the pin will soon be ground smooth and true all over. Pressure should be kept on the pin by means of the two thumb nuts. Use coarse emery at first and fine for finishing. When through grinding, care should be taken to clean all the emery dust from the crank.—Contributed by W. F. Quackenbush, New York City.

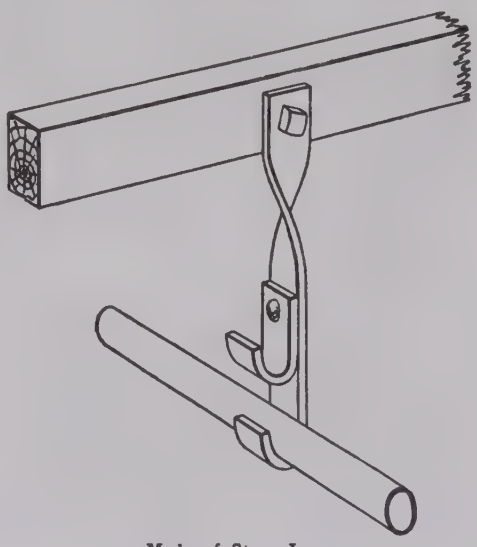


Lapping Tool

¶When your automobile is at rest, occasionally glance beneath it while the engine is stopped and the gasoline turned on. This caution may prove profitable.

A Simple Pipe Hanger

The hanger shown in the sketch consists of two or more small hangers, riveted together in such a manner as to form hooks at the required distance from each other, says the American Miller. The hangers are made of wrought iron, about ½-in. thick and 2 in. wide. The iron can be heated first and bent around a pipe of the same diameter as that which is to be used. This will prevent the pipe from vibrating after it is hung. If the pipes are to run in opposite directions, or to the beams above them, the iron can be heated and twisted to the right angle. The upper end is drilled to receive a ½-in. lag screw, by which the hanger is fastened to the beam.



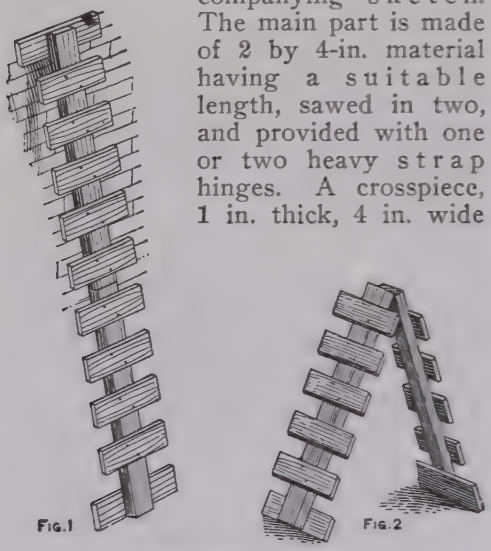
Made of Strap Iron

Paste for Hanging Burlap on Walls

The paste should consist of 1 lb. of good glue dissolved in 2 gal. of water, into which put enough paste powder to make it stiff, then add to the still warm paste 2 tablespoonfuls of turpentine or Canada balsam, and stir well. The paste powder consists of 84 parts of wheat flour or starch, 8 parts of caustic soda and 8 parts of sulphate of ammonia. All parts must be weighed.

A Combination Ladder

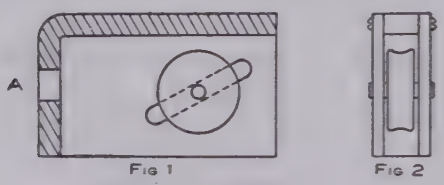
A handy and inexpensive ladder for use on a farm, around buildings, or on construction work is shown in the accompanying sketch. The main part is made of 2 by 4-in. material having a suitable length, sawed in two, and provided with one or two heavy strap hinges. A crosspiece, 1 in. thick, 4 in. wide and 3 ft. long, is nailed to the under side of the 2 by 4-in. piece on each end. The steps, which are of 1 by 4-in. material, are nailed on the upper side as shown. The full length ladder may be used as shown in Fig. 1, or made into a stepladder as in Fig. 2.



Ladder and Stepladder

Clothesline Tightener

A device for tightening clotheslines is shown in the accompanying sketch. One end of the clothesline is passed through the hole at A, Fig. 1, and a knot tied on the end so the line will not pull through. The other end passes over the pulley. The axle of the pulley runs in an inclined groove in each side of the casing. When the line is tightened, the effort of pulling will draw the pulley down to the bottom of the groove. When it has been sufficiently drawn up a slight outward throw will make the pulley run up the groove and join the rope between the wheel and the casing. A hitch over the taut line will hold the rope in any kind of a gale. Figure 2 shows the end view.—Contributed by J. H. Crawford, Schenectady, N. Y.



Pulley in Slot Holds Line

Lubricating an Automobile Engine After a Run

When a car comes in from a run the engine is very free and can be started easily, but after standing for three or four days some difficulty will be experienced in cranking because the oil has thickened around the rings and the engine is so stiff that the shaft cannot be turned fast enough to get a good suction from the carburetor. Kerosene is the best oil to loosen piston rings and a little injected into each cylinder at the time the engine is stopped from a run will greatly assist in starting the next time, whether it is a day or a week from the time the car was last used.

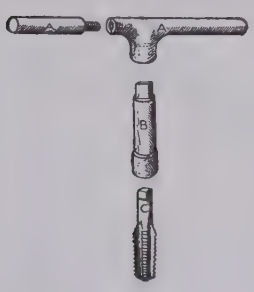
The kerosene should be injected into the engine while it is running, and the only way to do this is to introduce the oil where the suction of the engine will take it into the cylinders. The best place to have the oil enter the suction pipe is at some point near the engine and for this purpose much the most convenient way is to fit a small pet cock with a cup attached to the manifold, through which the liquid can be introduced into the cylinders while the engine is running. For an ordinary four-cylinder engine one-half a teacupful will be sufficient. When the proper amount of oil has been supplied the pet cock should be closed and the throttle opened and the engine run at top speed for a few seconds till the kerosene is cleared out of the cylinders. This will be evident because the car will smoke violently for a brief period after the throttle is opened and the

speed increased, when the smoke has disappeared one can consider the cylinders cleared.

With this treatment the engine will stand for a week or more and be as free and easy to turn as when it is nicely warmed up after an hour's running. It not only makes starting easier, but the motor operates much better at the beginning of a drive than is the case when the piston and rings are more or less gummed with oil. It does not seem to matter how good an oil may be, it always "sets" a little on the rings and cylinder walls after a long rest. This precaution also has the effect of reducing carbon deposits in the cylinders and tends to keep the interior clean if regularly done at the completion of all long runs.

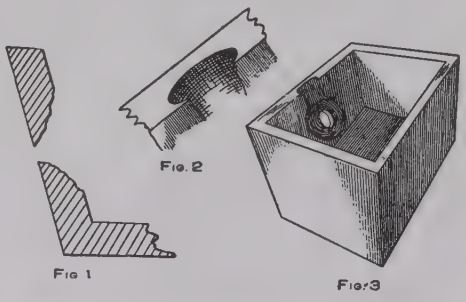
An Offset Tap Wrench

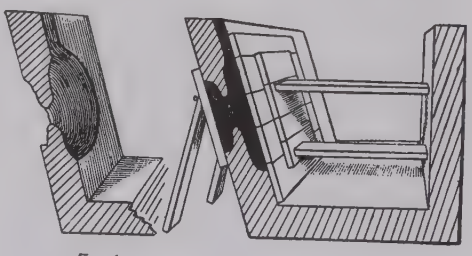
A single or double-handle offset tap wrench with socket is shown in the sketch. The handle, which is in two parts and represented by A A, can be separated and used with one side making a single-handle wrench as is often required. The part B is a socket of suitable length for holding taps which are required for special work. This socket is fitted tightly in the handle and may be made in several sizes convenient for different taps. The tap is represented by C.—Contributed by C. Purdy, Ghent, O.



Cementing a Rotted Hole in a Wooden Tank

Cement is not usually considered the best material for repairing wood tanks, but I have used it in one instance to repair a tank which had rotted through, and was in such water-soaked condition that white lead and wood were out of the question for repair materials. As it was in almost constant use, little time could be allowed for anything to dry, so cement was used as an experiment.





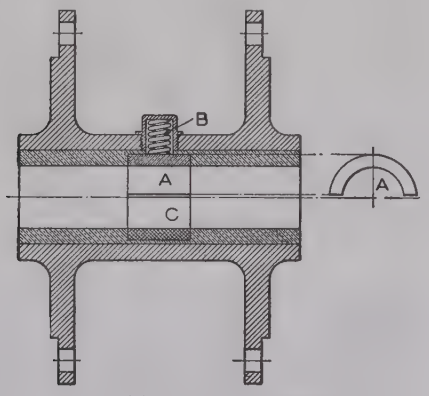
Filling the Hole with Cement

The tub was made of 2-in. white pine, and the rotted space of 18 in. in diameter had been eaten through one of the sides. (See Fig. 1.) This space was first deepened and a groove guttered all the way around inside of it so as to make a surface for holding the cement. The hole was then enlarged and gouged out on the outside in the form of a screw head, and a channel cut for pouring the cement. The pouring channel is shown in Figs. 2 and 3, and the shape gouged out for the cement on both sides of the board is shown in Fig. 4. Boards were then placed against the tub inside and outside and braced, and the cement mixture poured in (Fig. 5). The cement hardened properly, so that when the confining boards were removed, the job was perfectly watertight, and remained so.—Contributed by James M. Kane, Doylestown, Pa.

¶Apply pumice to the surface of greasy belts to prevent their slipping.

Stopping Gas Leakage Through Bearings of a Gas Engine

The accompanying sketch shows a simple method of stopping gas leakage

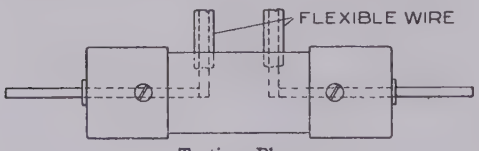


Division Between Cases

through the crankcase bearings of gas engines of the two-cycle type. Many remarkable results have been obtained by this method, usually increasing the speed of the engine from 30 to 50 r. p. m. A groove, 3/16 in. deep and about 1 in. wide, is cut in the bushing as shown in the sketch. A half bushing, A, is then made that will just fit this groove and also fit a spring, B, to hold it down on the shaft. The lower half of the groove C should be filled with babbitt. As the wear of the crankshaft is downward, the bushing A follows it, thus making an airtight bearing.—Contributed by John Murrie, La Crosse, Wis.

A Handy Series Attachment Plug

I had occasion recently to take some quick ammeter readings of our lights and motors. To do this I devised a set

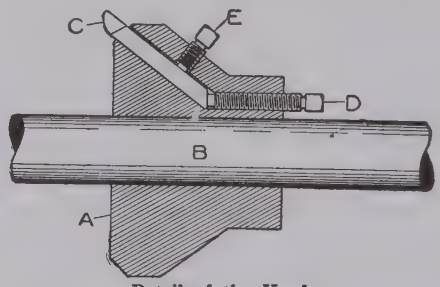


Testing Plug

of handy series attachment plugs, one of which is shown in the accompanying sketch. The plugs were made of burned out inclosed fuses in sizes according to the current carried. After taking them apart and removing the burned fuse and insulating powder I soldered a piece of flexible wire to each of the end terminals and put the plug together, bringing the wire out through holes in the fiber tube, and connecting them to the ammeter shunt. To take a reading it was only necessary to remove one fuse from the cutout, which could be done while the load was on by putting a jumper around it, and inserting the plug. The plug can be used for other series work as well, in the same manner.—Contributed by E. F. Brough, Tweed, Ont., Canada.

Boring Bar Cutter Head with Adjustable Tool

The usual form of a boring bar provides no way to set the cutter only to drive it into place with a hammer.



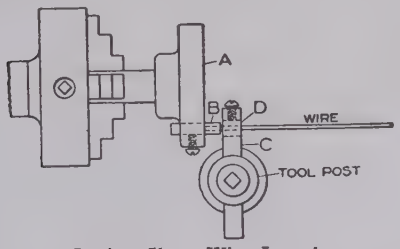
Detail of the Head

While this method must be used in boring holes of small diameter, a cutter head with screw adjustment for the tool can be made for boring engine cylinders and holes having larger diameters. In the accompanying sketch, A illustrates the cutter head and B the boring bar. The cutting tool, C, is adjusted by the screw D and held by the screw E. The cutter head, A, is fastened to the boring bar with either a set screw or key.—Contributed by Chas. Hattenberger, Buffalo, N. Y.

¶Wagon wheel spokes may be made to fit tight by splitting the tenon with a chisel and driving a wedge in the split. Saw the wedge off close to the felloe. This work may be done when resetting tires.

A Speedy Wire Cutter

In the manufacture of novelties a great many short pieces of wire are needed for rivets and other purposes, and it is sometimes quite a task to cut them up into the proper lengths. The accompanying sketch shows a device that was arranged for this purpose. The disk A is placed on a short shaft which is held in the lathe chuck. The tool B is held in the disk by means of a set screw and should extend out from the face of the disk the length the rivets are to be cut. A piece of steel, C, is held in the tool post and holds a hardened bushing, D. The hole in the bushing should be the same size as the wire to be cut. To operate, let the tool B extend from the face of the disk the length you wish to cut the wire, then

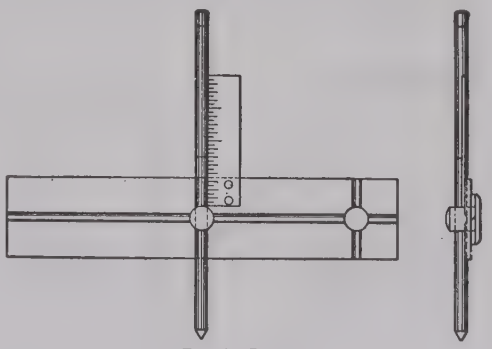


Cutting Short Wire Lengths

place the piece, C, with the bushing, D, so that the tool, B, will just pass it without touching. Revolve the disk and the wire will be cut into the proper lengths as fast as it can be fed in.—Contributed by A. J. DeLille, Elgin, Illinois.

A Sensitive Depth Gauge

A light, sensitive depth gauge that will compare favorably with those now on the market is shown in the accompanying sketch. Any machinist can easily make it without much trouble or expense. Secure a flat piece of steel of suitable size and plane grooves in it on one side as shown. These grooves serve as guides for a rod or finger which can be any length. Point and harden the rod at the lower end. A flat headed pin, as shown, holds the rod in place. A spring washer should be placed under the head so that the pin will hold the rod firmly, yet allow it to slide for adjustment. Attach a



Depth Gauge

small scale to the blade with a couple of rivets as shown. Make division marks on the rod equal to the length of the scale, and as the rod or finger is pushed down the depth can be read off on the scale. The rod can be placed in several different positions as the grooves on the blade indicate.—Contributed by L. H. Kresge, Scranton, Pa.

An Improved Pin Punch

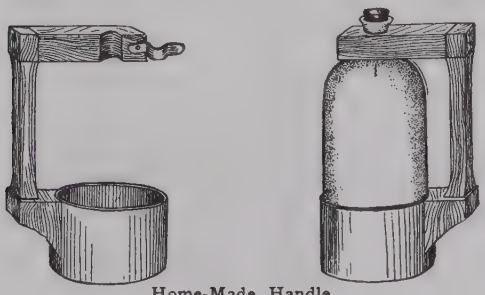
In assembling small machines, says a correspondent of the American Machinist, it is often necessary to have a variety of pin punches. The usual one-piece punch bends or breaks, and has to be scrapped. The accompanying cut shows a simple pin punch which can be made in several sizes to suit. Both ends of the punch holder are hardened, while the punch itself is made from long pieces of tempered drill rod. When a punch breaks or bends, the workman grinds off another piece of the rod to replace the broken one. A drop of oil in the holder is

Removable Punch Ends

sufficient to hold the punch in place, and by heating the holder the oil boils and forces the punch out. Punches of this sort are stiffer and better than those turned from solid tool steel.

Detachable Bottle Handle

A great many households use water, bought in gallon bottles, for drinking purposes. These bottles are usually kept in the ice box and when a glass of water is wanted it is poured from the bottle. The accompanying sketch shows the construction of a handle made for the purpose of attaching to the bottle to make it easy to pour the water. This handle also provides a means of carrying the bottle.

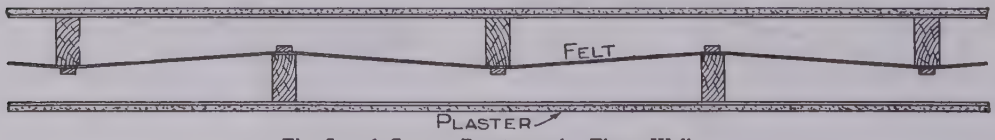


Home-Made Handle

The bottom part of the handle is made from a large tin can cut in two and attached with wood screws to the wood handle piece. The top of the handle is fitted with a horizontal piece of wood on which a half circle notch is cut to fit the bottle neck. A metal clip, fastened with one screw, holds the bottle in place.—Contributed by W. A. Jaquith, Richmond, Calif.

How to Deafen Center Walls and Floors

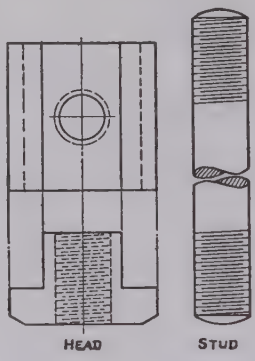
A very good way to deafen a center wall in a double house is to set a double row of studs, as shown in the accompanying sketch, says a correspondent of the American Carpenter and Builder. The studs are of 2 by 4-in. stuff, set in the usual way, but staggered so that the face lines will be 6 in. apart. This will leave a space of 2 in. between the studs and the plastering. Then on the inner edges of the studs, heavy felt paper or hair insulator quilt should be stretched and made secure by nailing a lath over the stud, as shown in the sketch. Two by 6-in. plate can be used at the top and bottom. The floors should be deafened, also, and this can be done very satisfactorily by putting down a rough floor of shiplap, and after all rough work is done, covering this with felt or hair cloth, and then laying the finished floor.



The Sound Cannot Penetrate the Three Walls

A New T-Bolt for Planer Beds

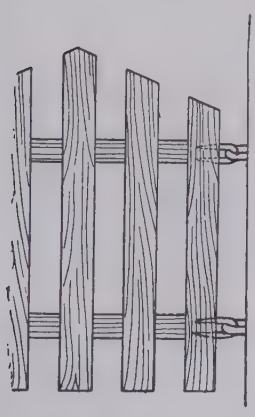
A bolt head and stud for use in the T-slots of planers, milling machines, shapers and the faceplates of lathes is shown in the accompanying sketch. It is better than a machine bolt as it will not turn when tightening the nut, nor will the head pull off, as is often the case with a carriage bolt. The studs are threaded alike on both ends to a length equal to the depth of the head. In constructing the heads a bar of steel is milled to the desired size and the stud holes drilled and tapped all the way through before the piece is cut into the proper lengths. For a ¾-in. bolt the heads are made 1½ in. deep and 2 in. long, this being of ample size to protect the T-slots in the machine from crumbling and to insure long life to the head itself. In service the studs are ordinarily screwed in the full depth



of the head or until tight and their length in the clear is determined and rated in this position and a supply progressing in length by inches should be kept in stock. Should it be desired to put an additional clamp on work already set, the stud is easily loosened with a pipe wrench and replaced in the head, which meanwhile has been slipped through the slot to the required location, or when the cross rail is so close to the work that there is no room for a bolt to project above a nut and a fractional length of bolt is needed, the stud may be partially unscrewed, the remaining thread still being sufficiently strong. The heads are practically indestructible but the threads may wear off on the one end in time and in that case the stud can be cut off to the next smaller size.—Contributed by Donald A. Hampson, Middletown, N. Y.

Staples Used for Gate Hinges

Two of my ranch buildings were built with a small space between them, and this space I had occasion to close up with a gate. I had no hinges at hand and knowing that those made of leather always sag, I set about to make up something that would answer the purpose. I secured four large staples and drove two of them into one of the buildings so the points of each staple were in a horizontal position, allowing a small portion of each to project. Into these I placed the other staples and drove them into the gate with their points in a vertical position. The illustration shows the position of the staples. This made a good hinge for the light gate I used.—Contributed by Frank Robert, Lauder, Wyo.



Handle for Upending Barrels

The ordinary way of upending barrels is to take hold of the edge at the floor or ground and lift, which is quite hard on the back as well as the hand that grasps the barrel rim. If you have many barrels to handle, the device shown in Fig. 1 will be of great assistance. The construction of the device is simple and it can be made in a few minutes' time. The handle is about 3 ft. long, on the lower end of which is fastened a block having one side hollowed out to fit the curvature of the barrel. An iron hook is fastened in the wood 6 or 8 in. below the hand grip. The handle is used as shown in Fig. 2. —Contributed by Don C. Higbee, S. Omaha, Nebr.

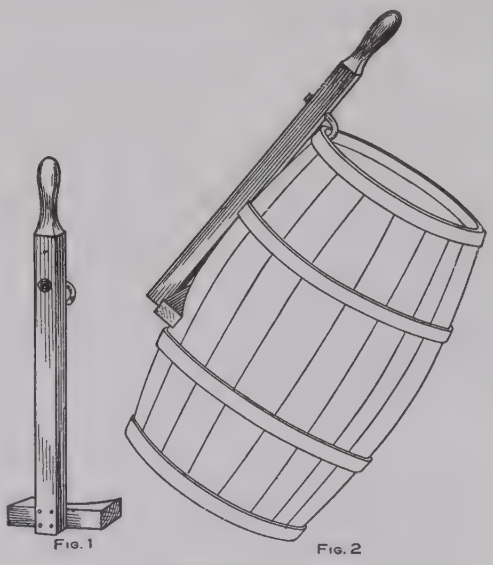


FIG. 1 FIG. 2

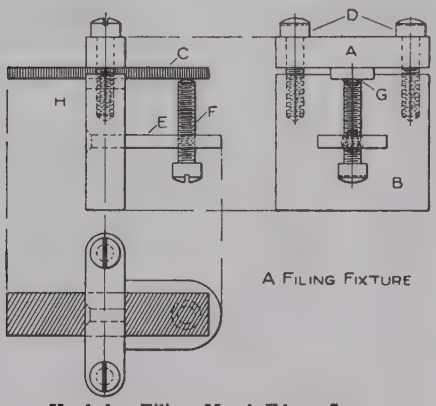
Upending a Barrel

How to Make a Good Imitation Ground Glass

Procure a quart of elastic varnish (of a good quality) and mix with it 2 lb. of finely ground pumice stone. By flowing a coat of the above on a glass it will give a very good imitation of ground glass. It can very easily be removed with a paint remover.—Contributed by A. B. Mukay, Augusta, Ga.

A Filing Fixture

A tool which is used for filing the edges square on thin pieces of metal is shown in the accompanying illustration. While the device is not new to



Used for Filing Metal Edges Square

jig or gauge makers, it is rarely seen in the "kit" of the average machinist.

In the fixture, C represents a short piece of a narrow file, secured between the members A and B by two small screws, D. By holding a square at H against the piece B, and adjusting the screw F, the file can be brought to a right angle to B. The screw maintains this angle while the tool is held, by that end of the file and the part E, in the right hand. In operation the tool is held firmly against the flat surface of the work and used as a draw file, and in this manner a square edge is insured with very little effort on the part of the workman. A beveled edge can be obtained in the same manner if the angle is not too great. If a hole is to be worked out, the flat file is removed and a round one substituted in the V-slot at G. If a little care is used in roughing down, this little tool will be found a very useful article and well worth a place in every machinist's tool-chest.—Contributed by Robt. O'Neal, Baltimore, Md.

How to Sharpen a Lawn Mower

Take the driving wheels off, remove the ratchets, and change them, placing the left ratchet on the right and the right ratchet on the left side of the machine. This will cause the revolving blades to strike backwards on the cutting bar. Put some heavy machine oil in the groove on the cutting bar and place some emery dust in the oil. Turn the mower upside-down and push it around, keeping the cutting bar in close contact with the revolving blades. As soon as the blades are sharp, wipe off the oil and emery carefully, and change the ratchets. This will sharpen the blades more evenly than can be done with a file.—Contributed by Ernest Boyce, Winterset, Iowa.

A Quick Repair for a Cracked Water Jacket

A short time ago I was called upon to repair a crack in the water jacket of a gasoline engine that was caused by freezing. The crack was about 8 in. long and had spread open about $\frac{1}{16}$ in. as the water was still frozen solid when I arrived upon the scene. I was somewhat puzzled to know what to do until I saw a can of putty standing nearby which gave me an idea. I scraped a piece of asbestos into fine particles and mixed it with the putty, about two parts of asbestos to one of putty, and then filled the crack with this mixture with the aid of a small packing tool. I then thawed out the engine and it has been running ever since and has never leaked a drop.—Contributed by Walter E. Roberts, Macdoel, Cal.

¶Ordinary sheet brass or that in the form of wire, as free as possible from lead, is better than brazing solder (half copper and half spelter) for brazing iron or steel, according to the Brass World, as it is tougher and the joint is less apt to break. Its melting point is only slightly higher than the half-and-half solder, and not enough to interfere with the brazing operation in any way. Ordinary high brass wire is often sold as "spelter wire" for brazing iron or steel.

SHOP NOTES

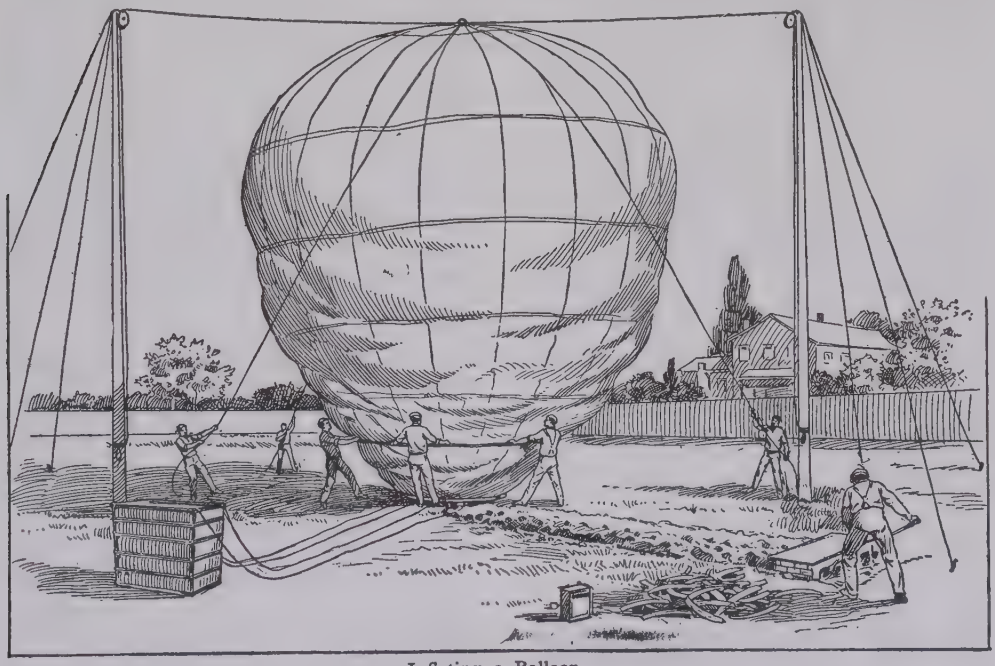
Aeronaut's Hot-Air Balloon—Part II

How to Inflate and Fly a Balloon

Having finished making the balloon, as described in a previous chapter, everything is ready for inflating and making a flight. Obtain the use of a field of suitable size, one that is in a sheltered place if possible. The best time to make a flight is in the afternoon of a still day.

Procure two poles about 35 ft. long. Each one can be made up of two pieces, joined the same as in making a high flagpole, but in either case they must be strong enough to carry the weight of the balloon. Each pole must have a pulley block at the top end, through which to pass the hoisting rope. This rope must be at least 120 ft. long to allow the part between the poles to sag and reach the ground where the balloon is to be raised. Put the rope through one pulley block and pass it through the ring in the top of the balloon, then put it through the pulley block on the other pole. Place the poles 42 ft. apart and guy each one with three ropes from the top. Each guy rope should be about 45 ft. long.

Dig a trench 2 ft. wide, 2 ft. deep and about 20 ft. long, beginning at the center between the poles. Place some pieces of heavy sheet metal over the top and cover with earth about 6 in. deep. Make a chimney of brick or sheet metal pipe about 2½ ft. in diameter over the end of the trench between the poles. At the other end of the trench make a clear place about 4 ft. square for use as a fireplace.



Inflating a Balloon

Place the opening of the balloon over the chimney and pull the top end up by

the hoisting rope as high as possible. Have a number of your friends take hold of the band that was sewed on the balloon for the purpose, and place a boy inside to direct them in keeping the cloth away from the chimney, also to give instructions to the fireman or inflater in regulating his fire. Start the fire in the fireplace of the trench, using old barrel staves as fuel, and throw a little kerosene on at intervals until the balloon is well heated and "stands on its feet," so to speak. During this period of inflation keep the cloth well out from the chimney and the ring around the opening close to the ground. The men holding the band can stand on the ring. The bag now crawls out and the hoisting rope is loosened and pulled away. If the wind is blowing enough to carry the top of the balloon around or to one side, the poles must be taken down.

The balloon is now ready for the ascent. The aerial passenger can use a trapeze or a basket, as he desires. If a basket is used, it must be attached to the ropes of the balloon before the inflation is started. Procure a strong, square luggage basket and fasten it securely to the ends of the four 12-ft. ropes attached to the bottom ring of the balloon. These ropes are laid out from the balloon's mouth to their full extent on the ground. The passenger must get in and take a secure hold on the basket to prevent being thrown out as it leaves the ground. The fireman now throws gasoline on his fire. This must be done with care, using a tin cup and keeping the receptacle away from the flames. This will give extra lifting power to the balloon. It is now time to make the start and shouting, "Get ready everybody," the fireman stops firing and places a cover on the entrance of the fire tunnel. Then with a "Let go everybody" the balloon rises upward and reaching a height of about 4,000 ft., gives its passenger a panoramic view of the surrounding country for many miles.

After about 10 or 15 minutes the balloon starts to cool and slowly descends, and, if in clear country, its passenger will make an easy landing. Care should be taken to hold the balloon, else it will rise again when freed from the load.

A Handsaw Depth Gauge

When sawing notches for joints, it becomes necessary to have some kind of a gauge to stop the cutting at the proper depth. Gauge saws can be purchased, but the small amount of use required for them will not warrant the keeping of the extra saw. The illustration shows a clamp gauge for use on any saw. In Fig. 1 is shown the construction of each clamp, and in Fig. 2 the assembled parts on the saw blade. The two gauge bars are fastened to the lower ends of the clamps with glue. When this clamp is set for a certain depth it is held in place by driving two wedges in the top ends of the clamps. —Contributed by Otto Borman, Jr., Philadelphia, Pa.

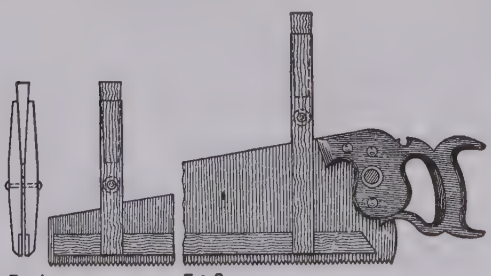


FIG. 1 FIG. 2

Gauge on a Saw

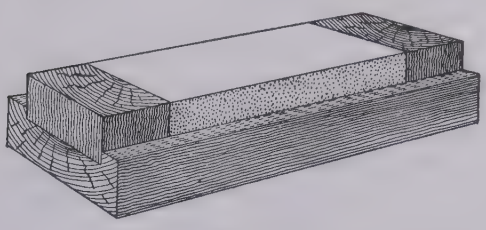
Inexpensive Concrete Culvert Forms

A new method of constructing concrete road culverts was devised by the commissioners of a township in Lee county, Illinois, using empty salt barrels for forms. A ditch is first dug 1 ft. wider and 18 in. deeper than the diameter of the salt barrel, and at either end of the trench an excavation is made about 1 ft. wide and 1 ft. deeper than the culvert trench and overlapping the culvert bore about 10 in. on either side. The concrete is filled into the excavations at the end and a bed

of concrete, 6 in. thick, is placed in the trench and smoothed off to form the bed of the culvert, with a grade of about 1 in. to 5 ft. Empty salt barrels are placed on this bed of concrete, end to end, allowing the heads of the barrels to remain in and the open end being supported with a piece of board to prevent crushing under the load. The concrete is placed in and well tamped at the sides, filling up all the space and 6 in. over the tops of the barrels. The culvert should be at least 6 in. below the grade of the road and after the concrete is set, dirt is filled in to make the grade level. The concrete consists of a mixture of 1 part cement and 7 parts sand and gravel, with sufficient water to make it rather wet. The heads in the barrels and board props can be removed with a long pole. The staves need not be removed as they will drop out in time.

Setting an Oil Stone in a Block

Oil stones wear away and make a hollow in the center caused by the bulk of the rubbing coming at that place. This can be corrected if the stone is set in a block, as shown in the accompanying sketch, with pieces of hard wood, about 2 in. long, set in at each end, their surfaces flush with the face of the stone. This will enable the workman to whet over each end of the stone as well as in the middle, thus wearing it away evenly. Should the stone show any hollow places after long use, take a piece of fine sandpaper and lay it

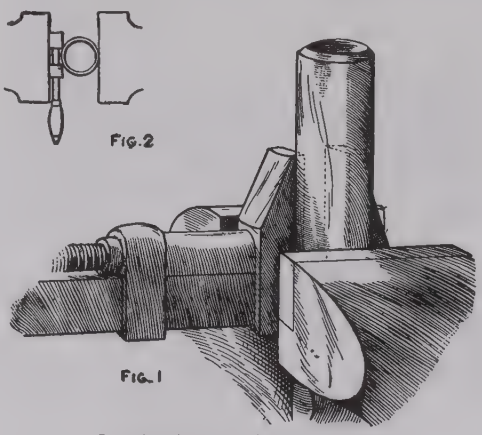


Hardwood Block at Each End

flat on a board, turn the stone face down and rub it briskly. This will dress the high places down and make the surface level.—Contributed by Wm. Lutzenburger, Dayton, O.

Holding Rods and Pipe in a Vise

All shops are not provided with a pipe vise, and in its place the arrangement shown in the sketch will prove useful in holding bolts, rods and pipes



Holding Round Pieces in a Vise

from turning while threading them. Take a common monkey wrench, open the jaws sufficiently, and clamp the rod or pipe and wrench in the vise in such a way that the surface of the rod or pipe is forced against the corners of the wrench jaws. This is shown in Fig. 1. The way the wrench is put in the jaws of the vise is shown in Fig. 2. When the vise jaws are drawn together the rod or pipe cannot turn in either direction.—Contributed by A. W. Augestine, Stromsburg, Nebr.

Cleaning Automobiles Without Water

Owners of automobiles should know that the less water used about a machine the better. Any metal part (except brass) unpainted is liable to rust, and water is no friend of rubber tires. A greasy rag or waste cleans off dust quickly and leaves the surface bright. Mud dried on cannot be removed in this way, but the spots can be carefully soaked off with a damp sponge.

¶The addition of cadmium to soft solder composed of tin and lead, lowers its melting point and increases its strength.

Jig for Removing Valve Seats

Having occasion to frequently reseat brass valve seats in pumps, and finding it difficult to keep an edge on the wide cutter which is generally used for that purpose, I made a jig, the details of which are shown in Fig. 1, to remove the valve seats so that they could be faced off in a lathe.

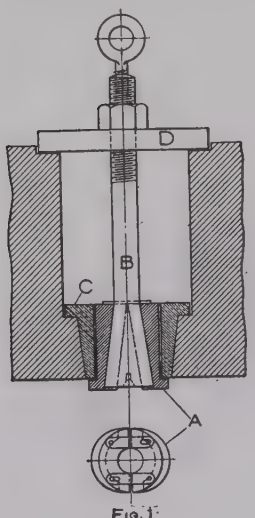


Fig. 1

A bushing, A, has a tapered hole, and B is a bolt with the head turned to fit this hole, and the other end threaded for a nut. The bushing is cut in two lengthwise, and enough stock removed at the lower part to allow it to close sufficiently at the bottom to slip through the hole in the valve seat C. The two halves are held together by means of two small straps across the top as shown in the lower plan view. A bar D, with a hole in its center for the bolt stem to pass through, is placed over the valve chamber. After the nut is placed on the bolt an eye is screwed in the end of it to facilitate its handling. When a strain is put upon the nut and the bar

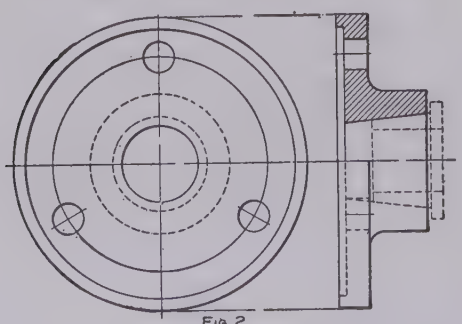


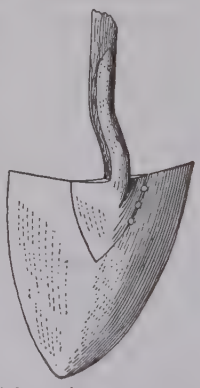
Fig. 2
Valve Jigs

tapped with a hammer the valve seat will readily pull out.

I also made a jig as shown in Fig. 2 for holding the valve seats in the lathe for facing. The back is counterbored to fit over the driver faceplate of a lathe, and is bolted to it. The hole is bored to correspond to the taper of the valve seats so they will fit in place tightly. After facing off the seats they were removed by tapping them with a rod through the hollow spindle of the lathe.—Contributed by M. P. Chitterbuck, Chicago.

Repairing a Broken Shovel Blade

The lightest and best shovels often break where the handle is fastened to the blade, leaving a crack that makes the shovel useless. The break can be repaired easily by putting a rivet or two in the crack and hammering them down. A shovel can be made as strong as ever by repairing it in this manner. If rivets are not at hand cut a spike in two about ½ in. from the head. This will make a very good rivet.—Contributed by Peter J. Taft, Clovis, Calif.



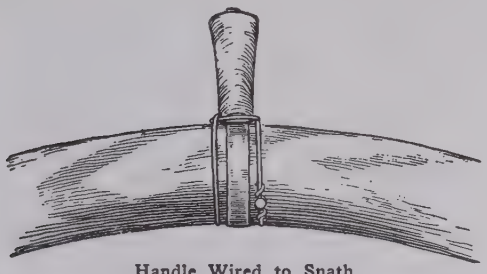
How to Anneal Novo Steel Cutters

When milling cutters have been ground and reground until the teeth are entirely gone it is the usual practice, in most machine shops, to anneal the cutters and recut them, making them smaller but just as good as new. Much difficulty has been found in trying to anneal novo steel but the following method has proven very successful: Secure a cast-iron box, and a quantity of cast-iron chips, such as are found around a planer or shaper. Pack the novo cutters in the box, placing some of the cast-iron chips around the edge of the box and between each cutter. After the box is filled, seal it with fire clay and place in a hot furnace for five hours. If it is convenient to leave the

box in the furnace over night to cool, much better results will be obtained. In any case the box must not be opened until it is cold.—Contributed by Chas. E. Klink, Lemoyne, Pa.

How to Prevent a Scythe Handle From Turning

Place the handle in the desired position on the snath and screw it up as tight as possible. Drive a three-penny nail into the opposite side of the snath, leaving about ⅛ in. of the head projecting. Fasten one end of a wire to the nail and turn the other end up over the snath and around the handle, pulling it tight all the time, then bend

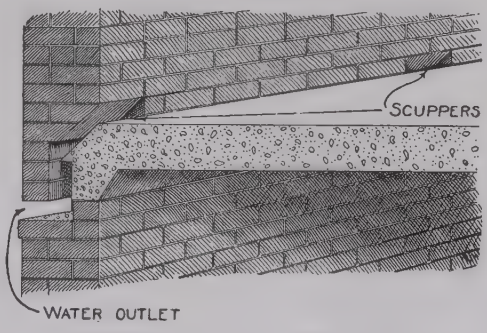


Handle Wired to Snath

it around and under the snath, then up and around the other side of the handle, and back to the nail again, where it is fastened securely. Drive the nail in to tighten it a little. This will hold the handle in place firmly and will not split the snath or blister the hands as where fence staples are driven in over the loop.—Contributed by B. Orlands Taylor.

Scuppers in Brick Walls

In case of a fire in a factory there is generally more damage done to the contents by water than by the fire. Especially is this true on concrete floors. Scupper openings should be made in walls carrying such floors to allow a free outlet for the surplus water to run away on the outside of the wall. This is necessary to protect the contents of the rooms below. The illustration shows the section of a brick wall and concrete floor through one of the scupper openings. The openings are formed with wood wedges which

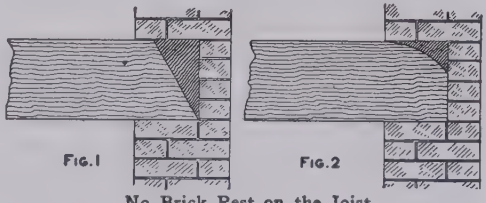


Scuppers to Drain a Cement Floor

are removed after the concrete has set. The rise at the end of the concrete prevents the cold air entering the building in the winter.—Contributed by Fred W. Hogloch, Akron, O.

Cutting the Ends of Joists

The ordinary way of cutting the ends of joists for entering a brick wall is shown in Fig. 1. If they are cut as shown in Fig. 2, they will be more effective and time will be saved in the cutting. The joists can be all laid without sawing them. The carpenter places his rule or compass on the lower edge of the joist at the intersection with the inside surface of the wall and describes an arc with a radius equal to the width of the joist. The corner of each joist is cut off on the line with a hand axe,

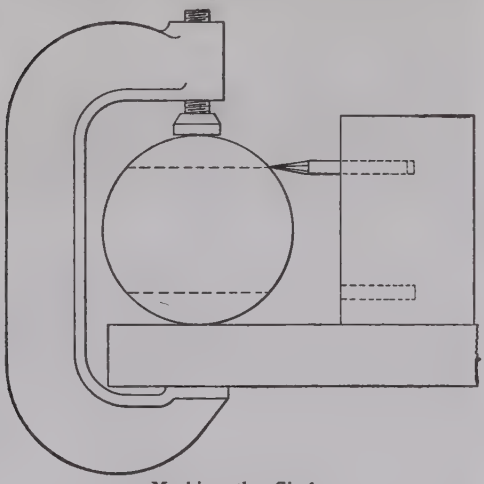


No Brick Rest on the Joist

making them rounding as shown. In case the building burns, the joists will fall without disturbing the wall as no bricks rest on the ends of the joists.—Contributed by E. C. Walker, Toronto, Canada.

How to Find Two Opposite Points on a Sphere

A simple method of finding two diametrically opposite points on a ball is shown in the accompanying sketch. The ball is clamped to a perfectly flat



Marking the Circles

surface, such as a faceplate or a marble table top, with an ordinary clamp. Secure a wooden block about the height of the ball and bore two holes in it, one near the top and the other near the bottom as shown. Fit a lead pencil in one of the holes and by moving the block about the ball trace a circle on its surface. Now place the pencil in the other hole and trace another circle in the same manner. The centers of these circles, which are easily found with a pair of dividers, are plainly the opposite ends of a diameter of the ball or sphere.—Contributed by C. W. Nieman, New York City.

How to Find a Sprinkler Leak

Not long ago an engineer had a sprinkler system extended into a new building in his plant. It was of the dry type with compressed air pumped into the pipes to hold back the water, says Practical Engineer. When completed they filled the system with air at 85 lb. and, behold, after two days there was only 35 lb., which same ought not to have happened for over six weeks.

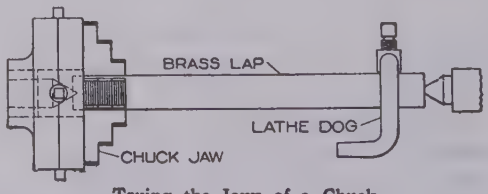
Soap lather treatment to the joints could give no hint of the location of that leak—but it was there just the same.

Our friend, the engineer, was a man of resources, and says he, "We'll chloroform the leak, and that'll put it to sleep so we can catch it napping easy." So he forthwith got 3 oz. of ether, poured it into the suction of the air pump that filled the sprinkler pipes and started the pump, in which case the ether went into the sprinkler pipes.

Foremen of the departments were warned to watch for the odor of ether, and report to the engineer. A day passed and no report; the ether wasn't yet working. But on the second afternoon word came that the leak was etherized and captured in a joint on the old system close to the new addition, caused probably by the strain when installing additional piping. So much for perseverance and using one's think tank. If you can't do a thing one way, do it two ways.

How to True Universal Chuck Jaws

A simple and inexpensive method of truing universal chuck jaws that have become badly worn and out of line, is shown in the accompanying sketch. Turn up a brass lap in the lathe so the centers will be perfectly true. Place this in the chuck and hold it between the lathe centers, as shown. It is to be kept from turning by a dog placed at the opposite end, and resting on the tool post support. Screw the jaws lightly against the lap, then apply oil and emery, and revolve the chuck.



Truing the Jaws of a Chuck

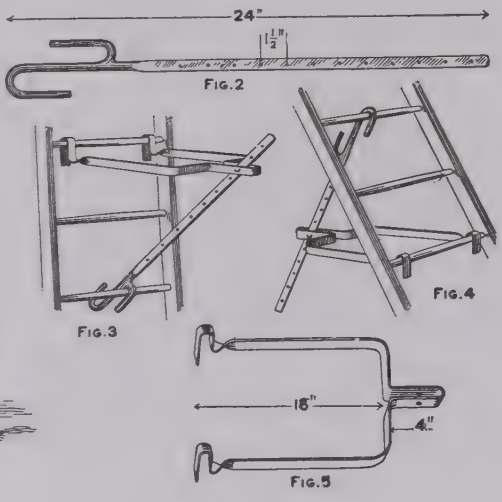
The jaws will be ground perfectly true in a very short time by this method.—Contributed by J. Weaner, Plainfield, N. J.

Ladder Attachments for Making a Scaffold

Painters who work on frame houses and do not have a swinging stage will find the ladder jacks shown in Fig. 1 a great help.

Each jack is made of ⅜-in. iron in two separate parts, the brace, Fig. 2, and the staging support, Fig. 5. These parts can be adjusted to any angle by taking out the bolt and raising or lowering the staging support to the desired position. The jacks are hooked on the rungs of the ladder as shown in Fig. 3. This is the usual position, but they can be reversed and used on the back of the ladders as shown in Fig. 4. For small places on the sides of buildings, sign work, etc., this jack will be found very useful.—Contributed by W. B. Smith, Guelph, Ontario.

The Scaffold in Use



Parts to Make the Jack

Bending Castings

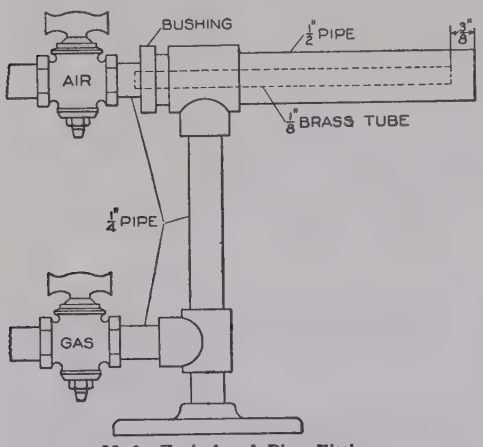
Anyone who has had anything to do with metals knows that castings of iron or steel, or the various yellow metal compositions, possess one characteristic in common—that of brittleness. Under great strain they bend but little and when pushed to the breaking point give little warning before a fracture. This property of brittleness prevents a piece that has been cast crooked from being straightened. The result is that innumerable castings are discarded annually. Heating and hammering the casting does not help the matter. It is possible, however, to straighten or bend castings when hot by use of the slower and more cautious method of weighting. Take, for instance, the case of a plate that has been warped in casting and which should be straight. This plate could be heated red hot, laid on another flat surface convex side up and a weight placed on the "hump." By giving the proper amount of weight the casting can be slowly and surely straightened. It may be convenient in some cases to fasten down one end of a casting leaving an overhanging end to which a weight is suspended by a wire.

The same results could be secured by the use of a press where pressure is applied by an adjusting screw which is set up slightly as the casting changes its form. I have used these methods with unfailing success on iron and steel castings and have saved time and money by avoiding delay in getting new castings.—Contributed by Donald A. Hampson, Middletown, N. Y.

¶Never run cutters backward in a milling machine.

A Blowpipe Made of Pipe Fittings

A blowpipe that can be made entirely of pipe fittings, which can be screwed together in a very short time,

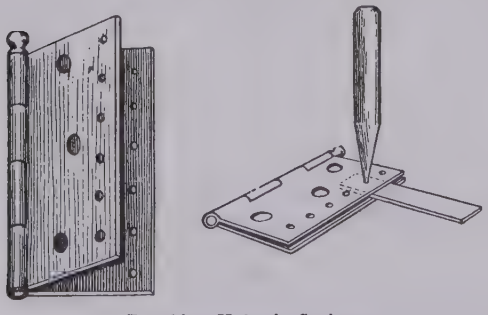


Made Entirely of Pipe Fittings

is shown in the accompanying sketch. By adjusting the air and gas cocks, a needle point flame or a powerful blast may be readily obtained with sufficient heat for light brazing. One advantage of this torch is that it cannot be blown out no matter how small the amount of gas nor how powerful the blast of air.—Contributed by S. W. Morrison, Baltimore, Md.

A Tool for Punching Holes in Springs

Take an ordinary hinge, 1½ by 3 in., close it and drill five or six holes about $\frac{5}{16}$ in. from the edge. Start with a $\frac{1}{16}$-

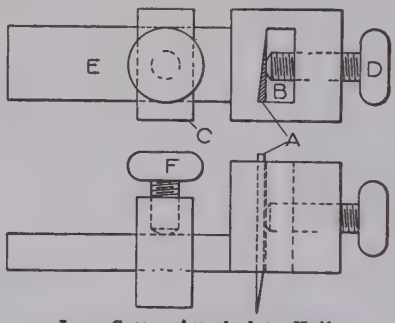


Punching Holes in Springs

in. hole first, then $\frac{3}{32}$, ⅛, and so on, until you have the sizes you wish. Secure or make a punch to fit each hole drilled. Countersink the top part of the holes just a little. Mark the spring where you want the hole and put it between the hinge, close the wings and adjust the spring so the mark will appear in the hole. Take the right sized punch and drive it through the hole and spring. The punch will cut a smooth round hole without cracking the spring.—Contributed by Rud R. Karich, Brooklyn, N. Y.

A Belt Lace Cutter

A simple attachment for a pocket knife blade which converts it into a belt lace cutter is shown in the accompanying sketch. The knife blade, A is held fast in the slot B by means of the setscrew D. The circular collar C is made to slide along the arm E and regulates the width of the lace to be cut. It is locked in place by the setscrew F. This cutter has proved to be superior to



Lace Cutter Attached to Knife

many of the patent cutters now on the market.—Contributed by H. W. Brooks, Shafter, Texas.

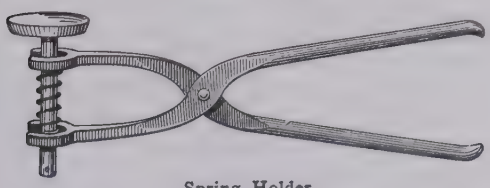
Removing Chatter Marks

Work taken from a machine with chatter marks on it will not be found perfectly true. When turning a piece in a lathe it sometimes seems impossible to remove the marks from the metal with a tool and with each succeeding cut the tool makes grooves in the same place. When the tool used has been ground with the top rake slanting to the right, change the rake to the left and it will remove the marks,

as the cutting edge will strike the lines of the chatter at right angles to the old marks, thus cutting through them instead of following the lines. In turning slender pieces the chattering can be stopped by increasing the feed a little more than usual.

Tool for Removing and Replacing Valve Springs

Removing and replacing valve springs on gasoline engines to regrind leaky valves is a very aggravating job on most all engines where a proper tool is lacking. Several different types of valve spring lifters have been invented and placed on the market. However, it can be readily seen that the tool illustrated can be applied to most any valve where the spring is accessible. They are made similar to a blacksmith's tongs and should be about 14 in. long, forged from $\frac{7}{16}$-in. round stock. The forked ends should have a U-shaped opening of about ½ in. The tip ends should be tapering to permit it being pushed between the coils of the spring easily. This tool can be quickly made and it will be found valuable to those



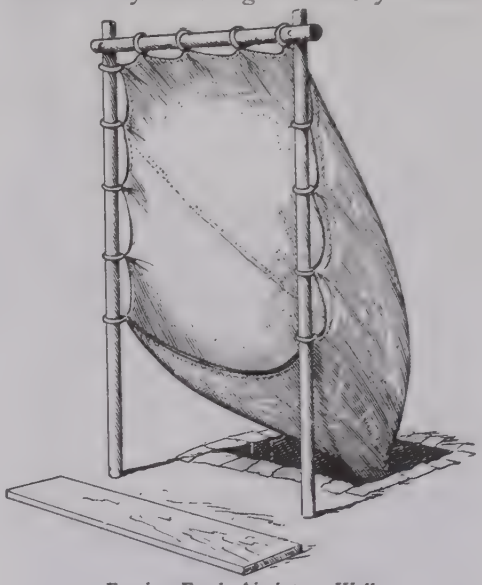
Spring Holder

who have occasion to repair automobiles.—Contributed by L. A. Cuson, Detroit, Mich.

Supplying Fresh Air to Well Diggers

In localities where firedamp exists underground, it is a difficult and dangerous undertaking to dig a well as the digger often loses his life by entering the deadly gas, which, being heavier than air, is found at the bottom of the well. If firedamp is suspected, a lighted candle may be lowered to the bottom of the well and if the gas is present the candle will be extinguished.

A method of furnishing fresh air to the person who is working down in the well is shown in the accompanying sketch. An air collecting sheet, a piece of ordinary sheeting about 2 yd. wide



Forcing Fresh Air into a Well

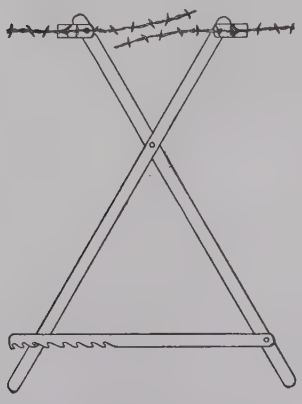
and 3 yd. long, is fastened to the posts. A pipe, 6 or 7 in. in diameter, is made of the same cloth with an enlarged funnel-shaped end which is sewed to the bottom end of the air-collecting sheet. Hoops are placed in the cloth pipe at suitable distances to keep the pipe open for the free passage of air. The edges of the air sheet should be reinforced so it will stand the pressure of the wind. The end of the cloth pipe should hang near the digger's head.—Contributed by A. M. Bryan, Corsicana, Texas.

How to Repair a Sagging Door

Doors frequently sag to such an extent that the latch will not engage with the mortise in the jamb. This annoying defect may be corrected by placing an object, such as a file tang, vertically between the outside edges of the wings on the lower hinge and closing the door easily, but firmly. This will spring the lower hinge sufficiently to raise the door so as to accomplish the result desired.—Contributed by C. W. Nieman, New York City.

Splicing a Wire Fence

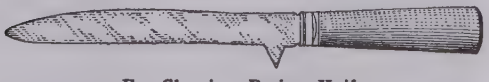
This device shown in the accompanying sketch is very handy for holding the wire of a fence while making a splice. It is made of two hard wood sticks or bars of metal, 3 or 4 ft. long, which are bolted together as in making a pair of tongs. Two small clips are bolted at the shorter ends of the bars. These are made like a hook to hold the wire. After placing the end of the wires in the clips they are pulled together in the same manner as closing the tongs. The bars are held together while making the splice by a crosspiece fastened to one bar and notched to fit a pin in the other bar.—Contributed by W. C. Parker, Olaf, Iowa.



A Potato Paring Knife

When the "eyes" of potatoes are deeply indented, the housewife has considerable trouble to pare them evenly. The ordinary paring knife has a pointed blade, and to clean the "eyes" the point has to be circled around the eye-pit.

The illustration shows how a wide knife blade may be ground down so as to leave a triangular "eye-cutter" near the butt of the blade. After a potato is pared the knife is held crossways in

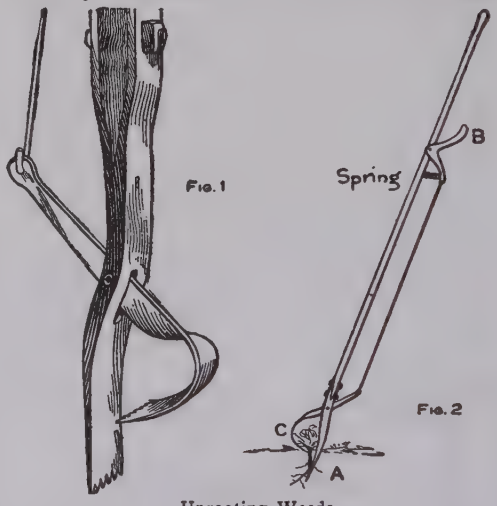


Eye-Cleaning Paring Knife

the hand and the spur of the blade set in each eye and twisted back and forth or revolved. The eyes are thus pared out evenly and with much saving of the edible part of the potato.—Contributed by Thaleon Blake, Sidney, O.

A Lawn Weeder

This new weeder shown in Fig. 1 makes a useful addition to lawn and garden tools. It is very simple and effective for removing dandelions and other weeds that are usually found in lawns. The instrument is grasped firmly in both hands and the point A, Fig. 2, is driven into the ground just behind the objectionable weed. The lever B is then pulled, thus bringing the second blade, C, to close on the first. The root of the weed is now firmly held in the grasp of both blades and by removing the instrument from the ground the entire weed comes with it. By releasing the lever B the spring



Uprooting Weeds

causes the blade to open, the weed drops out and the instrument is ready for another.—Contributed by W. B. Lipphard, Buffalo, N. Y.

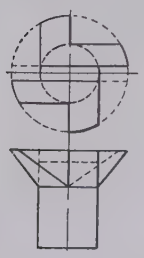
Protecting Steel Work with Cement Paste

The most efficient, durable and economical coating for steel girders in viaducts or overhead crossings to protect the steel from the corrosive action of locomotive gases is a cement paste mixed in proportion of 12 lb. pure red lead, 32 lb. Portland cement, 4 lb. linseed oil and 2 lb. drier. This mixture should make a paste like putty, and if too soft, cement and red lead are

to be added; and if too heavy, oil and drier are to be added. The iron or steel surface to be coated should be as clean of rust and foreign matter as it can be made, using either sand blast, steel brush, chisel, or sandpaper, for this purpose, according to the amount and hardness of the foreign matter to be removed. Apply one heavy coat of red lead and allow the same to set. Apply one heavy coat of Japan drier. Put the paste on this drier while it is wet. Do not allow the drier to become dry before applying the paste. The paste should be put on about ⅛ in. thick, rubbed with a trowel and pressed around rivet heads and angle flanges by hand. Cover over the paste with one coat of red lead. This last coat adds a great deal to the life of the coating, as it retards the hardening effect of the atmosphere on the paste.

Screw Head Used for a Countersink

A countersink will not cut the wood on a bevel to fit the various screw heads as the different sizes do not have the same bevel on the under side of the heads. Where the screw head is wanted to be flush with the wood and a neat fit is desired, make a temporary countersink from one of the screws. This is done by cutting the screw in two above the threads and filing the head, as shown in the illustration, to make a cutting edge. Use a brace and a screwdriver bit to turn the screw cutter in countersinking the holes. Turn the cutter down until the head is flush and it will make the exact bevel, cutting a perfect and smooth hole.—Contributed by C. L. Wall, Lawrence, Kansas.



Home-Made Wagon Tire Shrinker

Many small blacksmith shops do not have a regular tire shrinker as the cost is too great for the amount of work done on such a machine. These blacksmiths have occasion to shrink a few tires. The work can be done by using two steel clamps and an old rasp. The

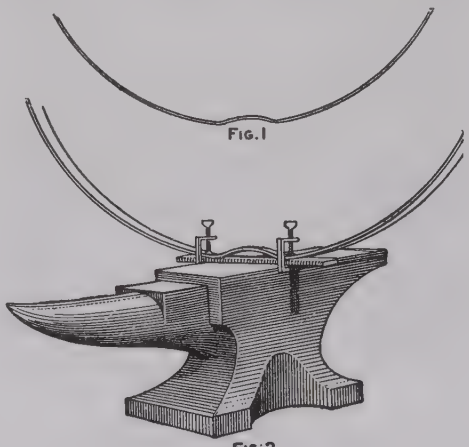


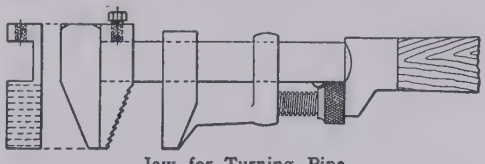
FIG. 1

FIG. 2
Shrinking a Tire

tire is first bent as shown in Fig. 1, then heated to almost a welding heat and clamped to the rasp as shown in Fig. 2. The rasp and tire are placed on an anvil and the bend hammered down. This usually upsets the tire sufficiently to make it a tight fit on the wheel. If one shrinking is not sufficient, a second bend can be made and hammered down in another place.—Contributed by F. M. James, Dewey, Montana.

A Detachable Jaw for a Monkey Wrench

The accompanying sketch shows a detachable jaw which, when applied to an ordinary monkey wrench, converts it into a first-class pipe wrench. It is best to make it of soft machine steel and then caseharden, as it is liable to break in the yoke if made of tool steel.

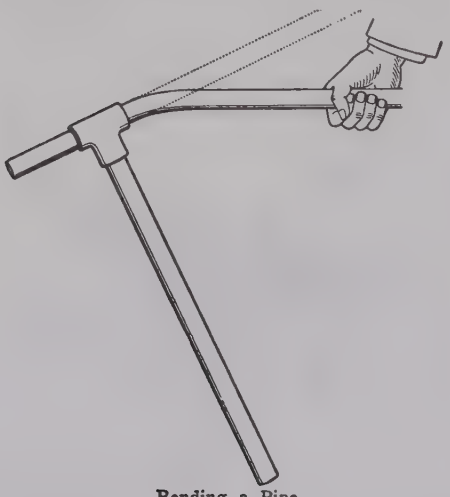


Jaw for Turning Pipe

It is held in place by means of a small set screw as shown.—Contributed by A. D. Johnson, Philadelphia, Pa.

A Pipe-Bending Tool

When putting in piping it is often necessary to make bends, turns, etc., other than those possible with elbows



Bending a Pipe

and tees. If a very slight indentation is not objectionable, a bend can be made with a tool, as shown in the accompanying sketch. A tool for bending small pipe can be made from a 3-ft. piece of 1¼-in. pipe with a tee screwed on one end. A bend is made by grasping the pipe in the left hand and with the right inserting the pipe to be bent as far in the tee as the end of the intended curve and pressing down. Pull the pipe out for successive bends until the desired curvature is obtained. This tool is very handy for conduit work on lighting circuits and is better for making a bend than a vise.—Contributed by Donald A. Hampson, Middletown, New York.

Pasting Labels on Tin

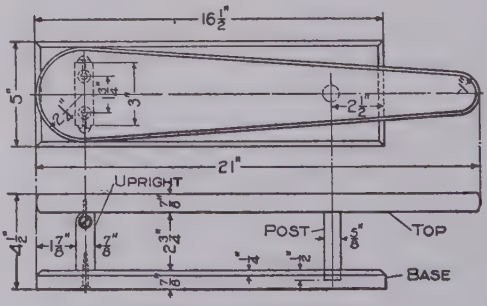
The reason that labels will curl off from metal surfaces is because the paste will contract in drying. If this shrinkage can be eliminated, the labels will stick on tin plate as well as any other surface. A correspondent of the Modern Painter has solved this problem by applying a coat of pure glycerine to the back of the label before pasting. The paper absorbs enough glycerine to prevent contraction, yet permits the necessary drying of the adhesive. Keep a convenient supply of glycerine in a wide-mouthed bottle and when required for use, tilt until the glycerine will run into the neck, then return the bottle to the vertical position. It will be found that enough glycerine to moisten the tip of a finger remains within reach. Apply with the finger to the back of the label and immediately paste over it as usual.

Sleeve and Shirt Waist Ironing-Board

The ironing-board shown in the illustration has two advantages over the kind with a fixed top. First, the top can be raised to a vertical position and the sleeve slipped over easily, and second, the top is more rigid as it is supported by an upright post.

The board is easily made from round stock, or the different pieces can be purchased from a mill, planed and cut to the size. The base is ⅞ in. thick, 5 in. wide and 16½ in. long. The edges are given a ¼-in. bevel to add to the appearance. The upright is fastened to the base with two 1¾-in. wood screws. The post is set into a ⅝-in. hole, bored ½ in. deep in the base.

The top is cut in the shape shown, and the edges made round so the cloth covering can be easily applied. The top piece must be covered with several



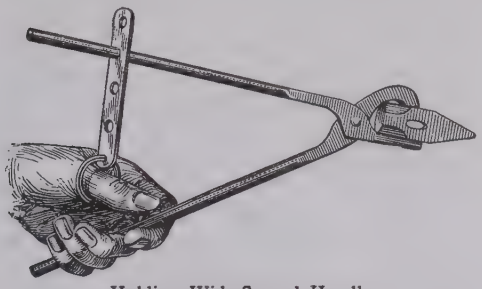
Detail of the Ironing-Board

thicknesses of cloth. Into the under side of this top board two screw eyes (preferably brass) are turned in a little over 3 in. apart, so as to clear the edges of the upright. Round-headed

brass screws are cut into the upright through the screw eyes, thus forming a hinge. This permits the top being turned back to receive the sleeve of the garment.—Contributed by Allison P. Ball, Worcester, Mass.

Adjustable Handle Link for Blacksmiths' Tongs

Some blacksmiths cannot afford to have a full line of tongs and the device shown in the illustration was designed to be used where the handles of the tongs spread beyond the grasp of the workman's hand in holding various kinds of work in the jaws. It is made of a piece of flat iron, ¼ by 1 in. and 6 in. long. Drill a ⅜-in. hole in one end and insert a ring about 1½ in.

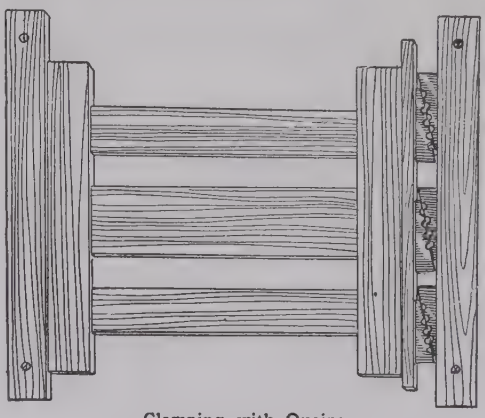


Holding Wide-Spread Handles

inside diameter. Beginning at the other end, drill four holes, each slightly smaller than the handle of the tongs. File the handle tapering so as to make a wedge fit when it is put in a hole. This will keep the device from coming loose when the tongs are thrown down. —Contributed by M. Kakara, Streator, Illinois.

Quoins Used for Cabinet Maker's Clamps

In making up pieces of furniture, for instance, gluing a table top together, gluing up a piece of panel work or anything of this kind, instead of having to buy the large and expensive cabinetmaker's clamps, I made use of three pairs of printer's quoins as shown in the sketch. Two pieces of wood are screwed to the bench or floor with ample room between them for the work, and the quoins are used in a manner similar to that in which they are used

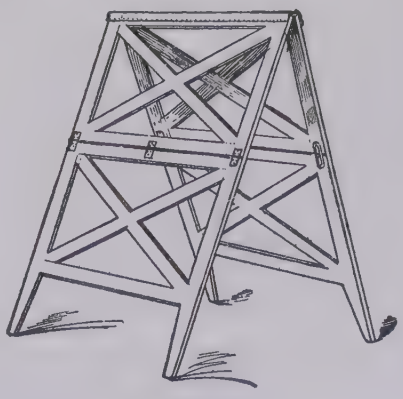


Clamping with Quoins

in the page or job press forms.—Contributed by H. M. Heyde, Houston, Texas.

Tapestry Display Rack

The show rack shown in the accompanying sketch was originally designed to be used by a traveling salesman for displaying heavy tapestry samples. It is so constructed as to fold to the trunk size and 2 in. thick, says the Upholsterer. The frame and braces are made of light wood mortised and set in so the entire rack will



Rack Ready for Use

have a smooth surface. This rack is not only a handy thing for the traveling salesman, but can be used to advantage on the salesroom floor as well.

Preventing Disturbance on Telephone Lines

By F. H. Tillotson

Explanation of Cross Talk and Other Disturbances and How They Are Overcome

As a usual thing the average telephone man will tell you that if two or more toll lines parallel one another, or if the telephone lines are in close proximity to power circuits, noise disturbances will be the result, the remedy being transpositions. But how many of these same men can explain to you why we have such disturbances or how transpositions remedy the same? The following explanation of line disturbances is offered in order that the work may be better understood.

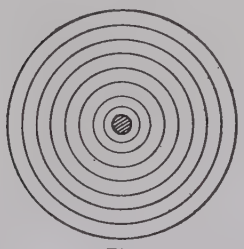


Fig. 1

Let us first consider a current flowing in a conductor. Around this conductor will be lines of force which compose the magnetic field. This is shown in Fig. 1, the conductor shown in cross section and the lines of force being closed circles. The strength of the field of force around the wire will of course depend upon the strength of the current flowing in the wire. If this current is constant and always in the same direction, then the field remains constant, but if the current is a changing one, then the field of force will change with it.

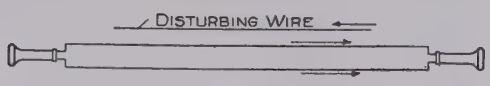


Fig. 2—Metallic Circuit

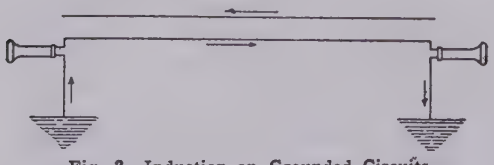


Fig. 3—Induction on Grounded Circuits

Let us suppose that a telephone circuit is so near a wire carrying a varying current as to be cut by the varying magnetic field. If the telephone circuit is metallic and both sides equidistant from the disturbing wire, and also in electrical balance, then the currents induced in each side will neutralize each other and no noise will result. Such a condition is shown in Fig. 2, the arrows showing the direction the currents flow at any given instant.

If the disturbing wire is nearer one side than the other, then the induced current in the nearest side will be the greater, hence they will not neutralize each other at the receivers and noise will result. In the case, however, of a grounded circuit, as shown in Fig. 3, you will notice there is no chance of neutralizing the effect of the induced current. It has a continuous path through both receivers to the ground, therefore a noise will be produced in both. If in any case the disturbing wire is another telephone circuit the conversation will be reproduced in the second circuit giving what is known as cross talk. This is most common in grounded lines.

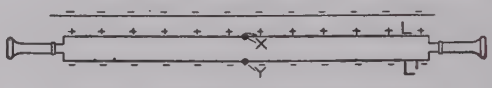


Fig. 4—Induction on Metallic Circuit

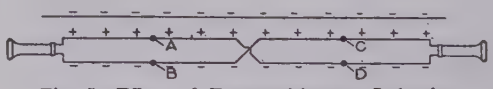


Fig. 5—Effect of Transposition on Induction

Now let us take the case of the metallic circuit in which the two sides are not equidistant from the disturbing wire as in Fig. 4. Let the side L of the circuit be nearest to the disturbing wire. At a certain instant the charge on the disturbing wire is negative. The side L will then have a positive charge and L^1 a negative charge. It has also been found that the points X and Y are neutral and if receiver is connected to them no noise will be heard. Now the positive charge on

the disturbing wire, which follows the negative charge will cause this negative charge to flow from Y to X through both receivers until L is negatively and L^1 positively charged, and so on for each change in the charge on the disturbing wire. Thus we see that as the charges on the disturbing wire vary we have alternating currents flowing through the circuit which produce noises in the receivers.

If we now transpose the lines as in Fig. 5 we will reduce the noise in the receivers but not entirely eliminate it. X and Y are no longer neutral points, as each half of each side has neutral points at A and B, and C and D. The charges now have four paths, instead of two, to the more remote portions of the circuit. Theoretically an infinite number of transpositions would be required to entirely eliminate induction,

Fig. 6—Transpositions on Two Parallel Circuits

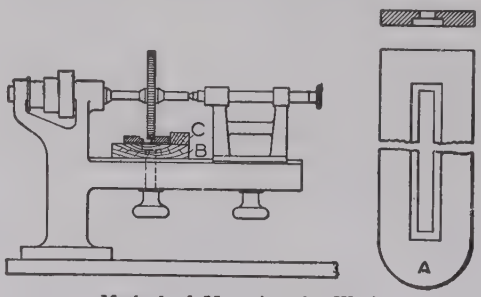
but practice has shown that in long lines transpositions at every ¼ or ½ miles are sufficient.

In making transpositions on parallel circuits care must be taken to see that such transpositions are so arranged that the circuits are always transposed against one another, thus avoiding bringing them back into the same inductive relation as at the start. For instance in two parallel circuits one should be transposed twice as often as the other as shown in Fig. 6. The use of twisted pairs of insulated wires for cables, inside wiring, and to some extent for outside work, accomplishes the transposition of circuits quite thoroughly. Every twist of the wire amounts to a complete transposition. This is the method employed in the construction of cables to overcome cross talk.

¶A good varnish for electric terminals is made of sealing wax dissolved in gasoline. To prevent brittleness add a little linseed oil.

Planing on a Lathe

The accompanying sketch shows how I rigged up my small lathe to cut a long slot in the strip of sheet brass

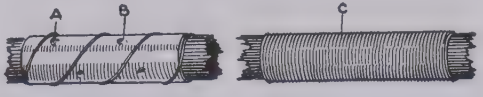


Method of Mounting the Work

shown at A, as I had a small lathe and some metal-cutting circular saws, but no planer. Removing the tool rest, I placed a pine board, B, across the ways and fastened it down with the tool rest clamping-pin. I carefully laid out the slots in the brass piece, then placed it in the proper position on the board B and fed it slowly against the rapidly revolving saw. Small strips of hard cardboard, placed under the brass strip served to regulate the depth of the cuts. In this manner I cut my slots smoothly and accurately without the aid of a planer.—Contributed by Thos. F. Williams, New Bethlehem, Pennsylvania.

How to Repair a Broken Buggy Whip

Secure a piece of tin about 2 in. long, and wide enough to reach around the whip at the place where it is broken. Roll the tin on the whip and hold it temporarily in place with a few strands of wire as shown at A in the illustration. Punch a few holes, B, in the tin with a nail, so the rough burr made by the nail point will hold in the whip.

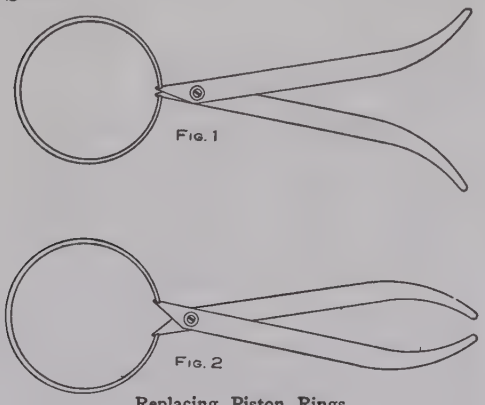


Binding the Break

Remove the wire and wind some shoemaker's thread around the tin as shown at C.—Contributed by Henry Larsen, Waupaca, Wis.

Tool for Removing Piston Rings

A very simple combination tool for the use of those manufacturing or repairing automobile and small gas engines can be made as shown herewith.



Replacing Piston Rings

The tool is made of two 1/16-in. strips of steel cut as shown in the sketch and fastened together with a screw and thumb-nut. By tightening the nut it can also be used as an inside or outside caliper. Figure 1 shows the tool in position for spreading the ring; Fig. 2, ready to slip on or off the piston.—Contributed by J. O. Brouillet, Tarrytown, N. Y.

A Substitute Paint Brush

How often does one want to paint several small articles with different colored paints and possesses only one brush, making it necessary to thoroughly clean the brush each time. I have found the following method very satisfactory:

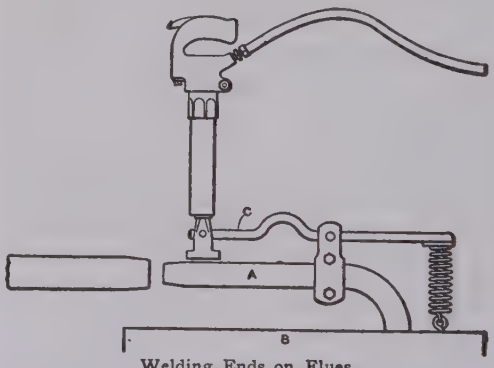
Procure flat sticks, each about ⅛ in. thick and 8 in. long, and tie a strip of muslin, say 2 in. wide, on one end of each stick as shown in the illustration. Wind the cloth around several times,

Temporary Brush Made of Cloth

tying it with thread so as to let the goods extend over the end of the stick 1 in. or more, then trim with scissors sufficient to give it the proper stiffness. This makes a fairly good brush. The broader the stick the broader the brush. The stick can be used over and over again as the brush part can be taken off and replaced with new cloth—Contributed by G. F. Orphal, New York City.

Pneumatic Flue Welder

An inexpensive flue-welding device that was designed to handle a large repair job that came in unexpectedly is shown in the accompanying illustration. It consists of a mandrel, A, which is attached to a cast-iron block, B, and a pneumatic hammer (equipped with a swage), which is mounted on a lever, C. As the illustration shows, this arm is fulcrumed to a bracket on the mandrel and is spring supported. The ends of the long pieces were first scarfed by



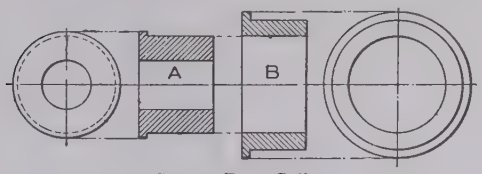
Welding Ends on Flues

lowering the back end of the tube until it was about 6 in. below the level of the mandrel. This gave a taper of approximately ¼ in. to the inch. After all the long pieces were scarfed, short pieces about 8 in. long were placed in the furnace and heated on one end so that they could be drawn to a feather edge. This was also done under the pneumatic hammer. After all the flues were scarfed and the short ends made ready for welding, the horse upon which the outer ends of the flues had rested, was raised to bring the work level with the mandrel. All short pieces were then put on the flues while hot so they would

shrink tightly in place, thus insuring a good clean weld by preventing any dirt from getting between the surfaces to be welded. After all flues were treated in this way, the furnace was cleaned, and the welding done at a speed which would make many of the costly flue-welding machines hustle to keep up.—Machinery.

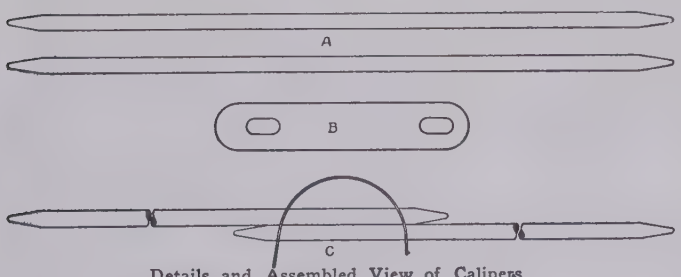
Sizing Collars for a Lathe Center-Rest

Where a great many shafts of different diameters are to be cut off in the lathe by using the center-rest, a set of collars as shown in the accompanying sketch, will prove very handy. The large one, B, is intended to be kept in the center-rest permanently. A set of small collars, A, should be made to fit the different sizes of shafting, and the outside diameter of these



Center Rest Collars

should be turned to fit the hole in the large collar. They should have a flange on them as shown, to prevent them from shoving through. Considerable time can be saved by their use as the center-rest need not be adjusted each time a different sized shaft is to be cut off.—Contributed by F. E. Randall, Pearl River, N. Y.

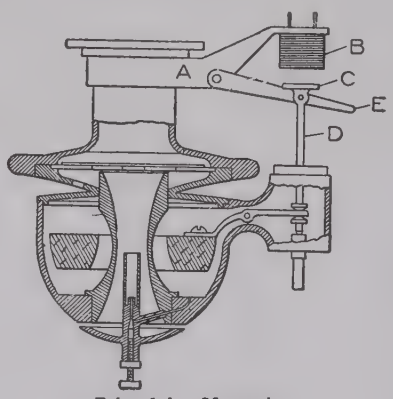


Details and Assembled View of Calipers

¶A piece of wire solder makes a good temporary spline for the draftsman.

A Magnetic Primer for Carburetors

A gasoline engine carburetor with a magnetic primer attachment is shown



Primed by Magnetism

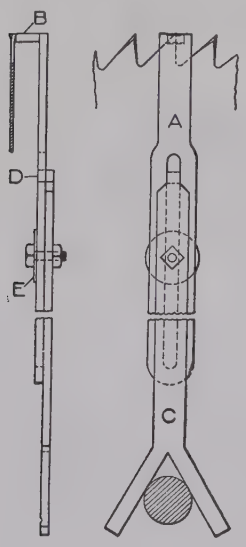
in the accompanying sketch. The supporting arm A fastens about the carburetor and holds the magnet B. When the current is applied, the plate C is drawn to the magnet, thus working the rod D. The lever E can also be worked by hand if desired.—Contributed by Leo. Beauchamp, East Hartford, Conn.

How to Make Inside Calipers for Large Work

It often happens that a machinist has use for a larger pair of inside calipers, especially on large engine and marine work, than is usually carried by the ordinary mechanic. A pair can be made in a few minutes that will do the work as well as the regular kind. Secure two ¼-in. tool steel rods of the proper length and point them as shown at A in the accompanying sketch. Then get a piece of spring steel about ¾-in. wide, 1/32-in. thick, and 4 in. long and cut ¼ by ½-in. slots in it as shown at B. When assembled as at C the caliper will be found to be adjustable, and sensitive enough for any class of work.—Contributed by J. R. Weaner, Plainfield, N. J.

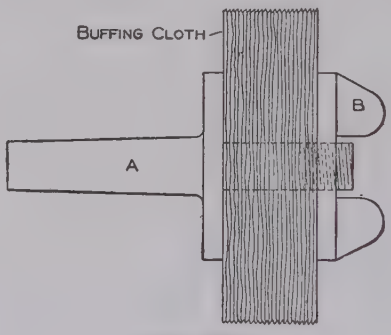
A Home-Made Circular Saw Jointer

The accompanying sketch shows the design of an adjustable circular saw jointer which will be found a very handy tool by saw filers. It can be easily made by a blacksmith out of a couple pieces of scrap iron. The dimensions can be varied to suit the size of the saws it is to be used upon, but the following size will be about right for most of them. The piece A is made of ¼ by 1-in. iron stock about 22 in. long. Split it and form a slot about ⅜ in. wide as shown in the drawing. Weld a piece of steel, B, to the top end and after it is bent temper it very hard. The piece C is of the same size stock and is about 15 in. long. It should be split at the lower end and two prongs formed, each about 4 in. long. The top is bent to form a lug, D, which slides in the slot of the piece A. A $\frac{5}{16}$-in. hole for the ¼-in. bolt should be drilled through the bar about 4 in. from the top. A washer, E, is placed under the head of the bolt to keep it from slipping through the slot. To use the tool place the forked end against the saw axle and adjust the length of the jointer to the radius of the saw. By running the teeth under the lug B the long teeth can be found and filed off.



Making a Keen Edge on Tools

The device shown in the accompanying sketch will prove handy for putting a keen edge on woodworkers' tools. It consists of a shank, A, tapered to fit in a lathe head stock spindle and a wing nut, B, threaded to screw on the opposite end of the shank as shown. Place several layers of buffing cloth on the threaded end of the shank and clamp them securely with the wing nut. Place it in the lathe center and while revolving it rapidly, apply some razorine or plater's crocus to the edge of the cloth. After tools such as gouges, chisels, etc., have been sharpened on the grindstone and rubbed slightly on an oilstone, touch them to this buffer first on one side, then on the other, and a much keener edge will be produced than could be obtained in any other way. For gouges this device is especially handy on account of their round edges. An emery-wheel spindle can be used to hold the buffing cloth if you happen to have one.—Contributed by J. C. Hansen, Chicago.



The Buffer

How to Prevent Highly Polished Metal Surfaces from Rusting

Take 1 oz. of pure beeswax and after cutting it up fine, place the pieces in a quart bottle and fill with naphtha or benzine. Cork tightly and after allowing it to stand for 24 hours or more, carefully draw off the clear solution into another bottle and it will then be ready for use. Take a small sponge and cover the article or surface you wish to protect as lightly as possible with the solution and then allow the parts coated to stand for 30 minutes or more so as to give time for the benzine to evaporate, after which polish with soft paper, clean waste or chamois skin.

Repairing a Split Water Pipe

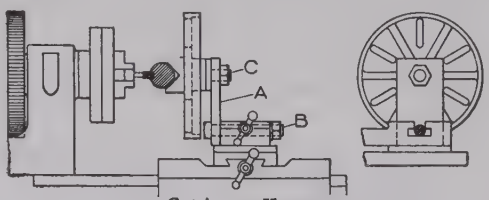
The pipe connecting my pump and well passes through the basement, and on wash day a split was found in the pipe and no water could be pumped. The split was in the pipe at a place close to the wall and in the corner of the basement where soldering it up was out of the question. An old inner tube of a bicycle was found in a woodshed and I wrapped a piece of this tightly around the pipe covering the split and for 5 in. on each side, stretching the rubber as tight as possible, then wrapped the rubber with small copper wire. The leak has given no trouble for over a year.—Contributed by L. E. U., St. Charles, Ill.

A Tool for Pulling Pipe

The pump repairman repeatedly has use for some kind of pipe pulling device. I have used various kinds, but never handled a safer and better tool than the one I designed myself. This tool I made from two pieces of 1⅛-in. square iron about 20 in. long, shaped on one end of each so as to fit around the pipe under a coupling. The other ends of the two pieces are drilled and each fitted with a clevis and both clevises connected with a link. Another link is made just large enough to slip over both pieces of iron and hold them close together on the pipe. Several sizes of links should be made to adjust the jaws to the various sizes of pipes.—Contributed by H. Toeffer, Mt. Carroll, Ill.

A Milling Attachment for a Lathe

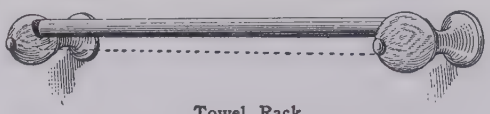
The accompanying sketch shows how I rigged up a milling attachment for my small lathe. With this device I can cut keyways in small shafting and do all sorts of light milling. I fastened a piece of steel, A, to the compound rest with a bolt, B, as large as would lay in the T-slot. I drilled a hole in this plate on the lathe spindle center-line, and into this I fastened a stud C. This stud has a shoulder which fits against the plate. Threads were cut on the opposite end to take the regular lathe faceplate which also screwed up against the shoulder. By bolting the work to the faceplate, which in turn was fastened to the compound rest as shown, and using different styles and sizes of end mills I could do a great many different kinds of milling jobs. Several adjustments could be made by changing the compound rest to different angles.—Contributed by C. L. Bryan, Corinth, Mass.



Cutting a Keyway

Home-Made Towel Rack

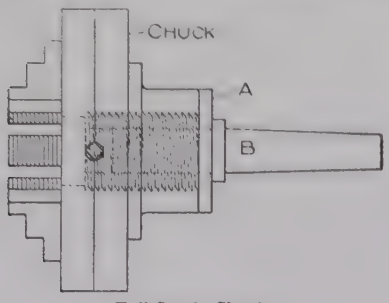
It is very convenient to have plenty of towel racks in the bathroom, but they are not often supplied on account of the first cost. Illustrated herewith is a towel rack that can be made at home and is inexpensive. The rack consists of two door stops and a round stick ½ in. in diameter. A ½-in. hole is bored in the side of each stop to receive the ends of the round stick. The holes should be bored about half way through the stop. Set the stops at the proper distance apart and turn them into the wall. The round stick is placed in the holes as shown in the illustration.—Contributed by J. C. Englehart, Richmond Hill, N. Y.


Towel Rack

¶A cocoanut may be easily broken by making two holes in the shell, extracting the milk, applying air pressure by blowing in the holes and quickly throwing it to the floor.

A Revolving Tail-Stock Chuck

The details of a revolving tail-stock chuck are shown in the accompanying sketch. The bushing A is threaded to screw into a chuck, preferably a uni-



Tail-Stock Chuck

versal chuck, and is bored out to fit on a spindle, B, which has a tapered end that fits in the tail stock of a lathe in place of the ordinary center. This revolving chuck will be found a very useful lathe attachment for holding large pipes while they are being threaded or cut in two. It can be used for steadying castings while a place is being turned on them for the steady rest, preparatory to boring. It takes the place of the cone-shaped pipe center and can be used where the ordinary pipe center is useless, as it will center by either inside or outside within its limits, and it also does not require end thrust to hold it in position.—Contributed by J. N. Thomas, Burlington, Wis.

Substitute Hook Latch Staple

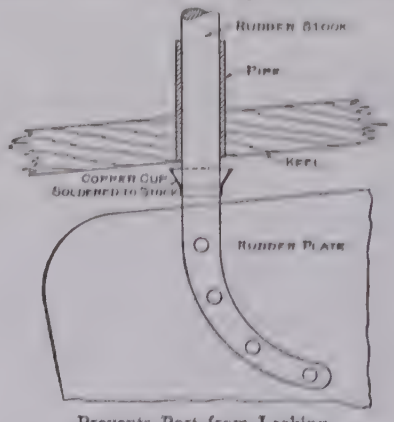
When putting a hook latch on a door it may be impossible to use a staple on account of danger of splitting the wood or the wood being too hard to drive a staple in without bending it out of shape. The illustration shows how to make a substitute for a staple that can be easily fastened to a door jamb without spoiling or splitting the wood. It is made of a strap of iron ½ in. wide and about 4 in. long. Draw out one end in the shape of a rod and bend it up in the form of an eye. Drill two holes for screws. This will make it possible to fasten both hook and eye with screws. —Contributed by W. C. Parker, Kanowha, Iowa.

Thin Chilled Edges and Scale Ruin Files

A thin chilled edge with a scale on castings will ruin a new file as the strain comes wholly on a few teeth and breaks them, says Motorcycle Review. This scale should be removed by pickling in a solution consisting of two parts of water to one of sulphuric acid, and the surfaces which have become chilled should be ground off before applying the file. If it is impossible or impracticable to remove the scale by pickling, an old file that has been used until it is too dull for narrow steel work may be employed; the teeth will not be broken by the hard scale.

How to Prevent Leaky Rudder Ports

A great many motorboat owners are bothered more or less by water coming



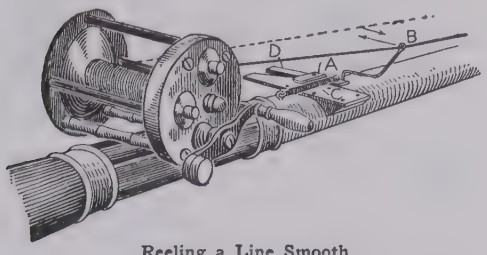
Prevents Port from Leaking

into the boat through the rudder port. It is often caused by the propeller forcing water up through the pipe when the boat is running, says a correspondent of Motor Boat. A simple, inexpensive and effective way to stop the leak is to solder a small piece of copper on the rudder post just below the rudder port as shown in the accompanying illustration.

SHOP NOTES

How to Make a Reel Line Guide

A great many fishermen have trouble with their reels in casting owing to the back lash or the reel running too fast for the unwinding line. A little home-made device illustrated herewith will enable the fisherman to reel his line so it will run out smoothly. It is constructed of the clapper from an old electric bell, together with the bar and pivots to which it is attached. The striker or ball on the end is removed and the wire bent into a ring. The device is secured to the rod in front of the reel as shown. A spring is attached at C to draw the wire on one side. Thread the line from the reel through the ring at B and on to the end of the rod. In use, grasp the rod with the left hand and manipulate the lever D



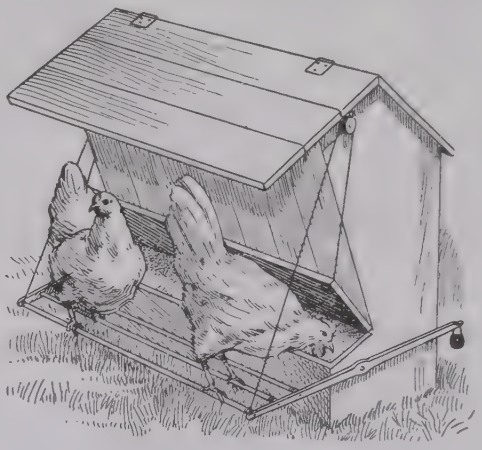
Reeling a Line Smooth

with the left thumb. The line can be wound on the reel evenly, ready for the next cast.—Contributed by A. G. Mason, Chicago, Ill.

A Chicken Feed Hopper

This hopper has some advantages that other feeding devices do not have. The automatic lid prevents the food getting mixed with dust and dirt. The fowl can open the lid at any time for eating and the food will only come in the manger as it is used. One filling of the hopper will supply food for two or three days. The fowls soon learn to use the feeder.

The hopper is 8 in. wide, 2½ ft. high and 3 ft. long. The roof projects over

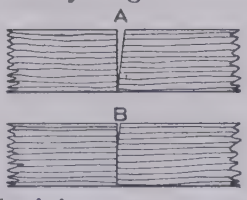


Chicken's Weight Operates Lid

the perch and hopper. The cords are attached to the lid of the manger and to the perch, running over pulleys fastened near the roof, as shown in the illustration. The perch is fastened on two cross bars pivoted to the ends of the hopper. The back ends of these cross bars are weighted so as to close the lid when no fowls are on the perch. The weight of one fowl will raise the lid.—Contributed by Warren Lewis, Butte, Montana.

Fitting the Ends of Two Boards

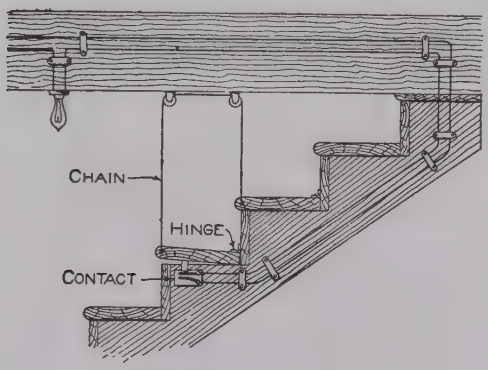
Many times in splicing boards the ends do not fit closely together as shown at A in the accompanying sketch. A simple way to remedy this is to hold them tightly together



and saw through the joint one or more times with a saw until they come together square as shown at B.—Contributed by Victor Metzech, Chicago.

Automatic Switch for Basement Lights

The electric basement light is many times forgotten and left burning when not in use, and sometimes allowed to



Steps Operate the Switch

consume current all night because some one did not turn the switch after arriving at the top of the stairs. Basements in stores are usually lighted in this manner and the electric lights are left burning many times by some clerk who is in a hurry and does not stop to turn the switch.

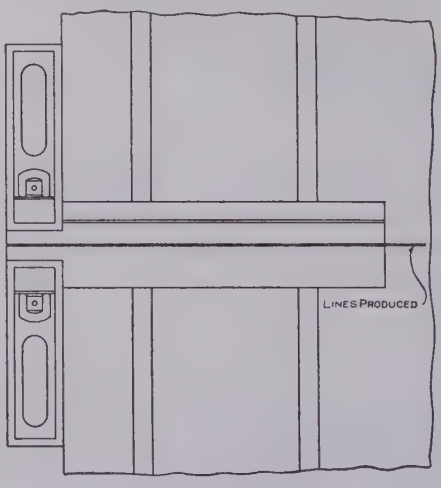
I constructed the device as shown in the sketch to take care of the electric light in my store basement. It would work automatically, turning on the current when anyone would go down the steps and turning it off when he came up. The main electric wires were connected up to a switch located near the end of one of the steps, about four or five steps down from the top. Two of the steps were hinged at the back and their outer edge fastened to a chain that ran over two pulleys screwed into a joist above. The chain was of such a length that when the front edge of one step was up the front edge of the other was down. When a person would go down the steps to the basement the lower hinged step would be pressed down last, thus making the connection for lighting the lamp. When going up the upper hinged step would be pressed down last thus breaking the connection and turning off the light.—Contributed by F. G. Christensen, Santa Rosa, Calif.

Keeping Paint Out of Oil Holes

When painting the automobile body and chassis be sure to stuff the oil holes with felt or waste before applying the paint. If this caution is not observed the holes will become clogged with paint which will prevent any oil reaching the bearing.

How to Prove a Try-Square

Try-squares of the removable blade type need occasional adjustment and where a standard square is not kept to prove them, they can be set by the method shown in the accompanying sketch, which will be found to be accurate enough for all but the finest kind of work. Remove the burrs from the edge of a planer table or any flat surface with a perfectly straight edge, and cover a strip, at right angles to the edge, about 1 in. wide and the length of the square blade, with a copper solution or powdered chalk. Place the beam of the square against the edge of planer and with a sharp scriber draw a line along the edge of the blade. Reverse the square as shown and draw another line close to the first and any



Testing the Square

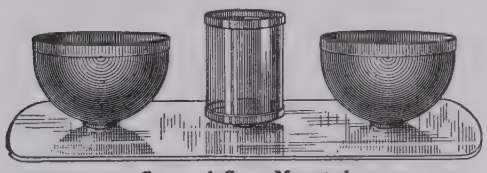
inaccuracy in the tool is apparent at once and can be corrected to a nice degree.—Contributed by Donald A. Hampson, Middletown, N. Y.

Oak Stain

An easy, and at the same time, a good way to stain oak in imitation of the fumed effect, is to boil catechu in the proportion of ¼ lb. to 6 lb. of water, after which cool and strain. Apply this to the wood, and when dry treat with a solution of bichromate of potash in the same proportion as with the catechu. Bichromate of potash alone in water will give a good stain. A solution of 2 oz. of pearl ash and 2 oz. of potash mixed in a quart of water makes a good stain. Potash solution darkens the wood, and when applied very strong will produce an almost ebon hue, due to what we might describe as the burning of the wood fiber.

Smoker's Set for the Engine Room

Procure a brass plate, two brass oil cans and one oil cup. Remove the bottoms from the cans so they can be used



Cup and Cans Mounted

for covers and then fasten the cans bottom up to the brass plate, or they can be screwed or bolted to a piece of mahogany. Attach the oil cup in the same manner. When the parts are polished the set will be very odd and attractive. —Contributed by Maurice Baudier, New Orleans, La.

Easy Way to Climb Poles

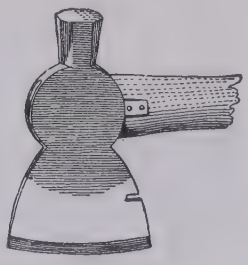
When one wishes to climb a flag pole it will be found very hard to do so with the shoes on the feet. The simple way illustrated makes it easy to climb a pole. The shoes are taken off and a handkerchief with two opposite corners tied in a square knot as shown in the corner of the sketch, slipped over the feet and up around the ankles. In climbing the pole, spread

Ankles Tied Together

the knees apart, thus forming a grip against the pole with the insteps similar to a pair of pliers. A person can take long leaps with much ease in going up. The handkerchief is shaken off when you start down.—Contributed by John Blake, Franklin, Mass.

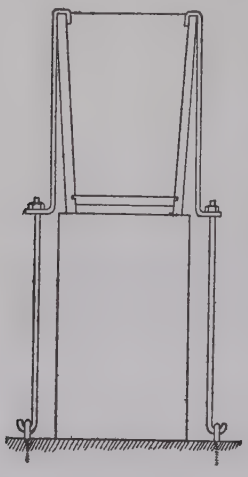
A Wedge for a Hatchet Handle

If a hatchet will not stay on its handle, take a piece of iron, $\frac{1}{16}$ in. thick, ½ in. wide and 3 in. long, bend a small portion of one end over at right angles and drill two small holes near the other end. Place this piece of iron between the handle and the hatchet with the end turned over on top of the metal part, then put two small screws through the holes into the handle. It may be necessary to make room for the wedge. This can be done by cutting a small groove in the handle with a chisel. The end turned over on the wedge should not extend over the side of the hatchet. This wedge makes it impossible for the hatchet to slip off the handle.—Contributed by Andrew Thome, Louisville, Ky.



Clamp for Holding an Ice Cream Freezer

It is always harder to hold an ice cream freezer than to turn it, yet very few persons think of rigging up a holding device. Clamps can be easily made, as shown in the accompanying sketch, to hold the freezer on a box or block at a height which will facilitate the turning of the crank. The upper bars are made of ¼ by 1-in. flat iron, bent as shown, and a ⅜-in. hole drilled in the bottom end for a rod. The rods are long ⅜-in. bolts with their heads cut off, and a short hook turned up on that end. Two ¼-in. screw eyes are screwed into the floor to receive the hook ends of the rods. It is best to oil the threaded ends of the bolts after using the freezer to prevent the salt water from rusting them.—Contributed by F. C. Bachman, Sherman, Texas.



Preventing the Wear on a Cotter

Where a cotter is used to hold a washer on the end of a shaft and a revolving hub of a wheel runs against the washer the latter often turns with the wheel and in time wears the cotter off. To prevent this I locked the washer and cotter in the following manner. A cut was made through the washer about ¼ in. from the edge and about 1 in. long. The strip was bent up and when the washer was put in place the strip was then bent down over the cotter as shown in the sketch.—Contributed by Thos. L. Parker, Olaf, Iowa.

Cost of Repainting Automobiles

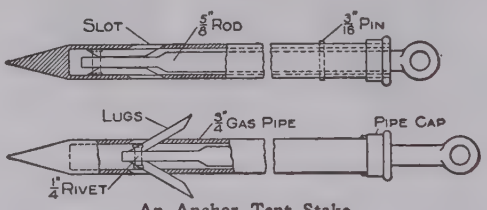
The average paint shop does not have data on the price to charge for repainting and varnishing automobiles. As this is a new line of work that has come to stay, the profit should not be cut, as is too frequently the custom on carriage and wagon work.

The following list of prices has been compiled by the American Vehicle, which represent the cost of work as charged by the regular automobile painters:

Revarnishing Limousines	$ 65.00
Painting and Varnishing Limousines	100.00
Burning off, Scraping and Painting up Limousines	125.00
Revarnishing Touring Cars	45.00
Painting and Varnishing Touring Cars.	75.00
Burning off, Scraping and Painting up Touring Cars	100.00
Revarnishing Runabout Cars	25.00
Painting and Varnishing Runabout Cars	45.00
Burning off, Scraping and Painting up Runabout Cars	65.00

A New Metal Tent Stake

A novel home-made tent stake is shown in the accompanying detail sketch. If it is well made it is far superior to the straight wood or iron ones commonly used. The body is made of ¾-in. gas pipe and should be about 2 ft. long. Heat one end and draw it down to a solid point so that it will drive easily. Thread the other end for a pipe cap as shown. The rod is made of ⅝-in. round iron, has an eye at one end, and is flattened at the other.



An Anchor Tent Stake

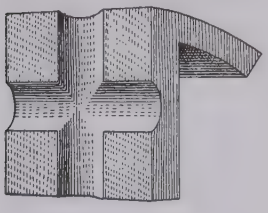
Make two lugs or prongs out of ¼ by ½-in. iron, each 2¼ in. long and taper the ends as shown. One end of each of these lugs should be drilled and countersunk for a ¼-in. rivet which fastens them to the flattened end of the rod and has play enough to allow them to fold against it. Two square holes should be cut in the pipe about 8 in. from the pointed end to allow these

lugs to extend through when they are spread. A pin fastened in the rod near the top end and working in a slot in the pipe regulates the upward and downward movement of the rod and also keeps it from twisting when the pipe is being driven. The cap at the top is to drive upon when setting the stake, and care must be taken not to hit the eye at the end of the rod.

After the stake has been driven into the ground, pass a rope through the eye and tighten. The upward movement of the rod spreads the lugs which catch the surrounding earth. The stake should be inclined towards the tent when it is being driven, so the rope will pull endwise upon it. The stake can easily be removed from the ground by pushing down upon the rod, thereby folding the lugs against the rod, and pulling up on the pipe.—Contributed by N. C. Best, Chatham, Ontario, Can.

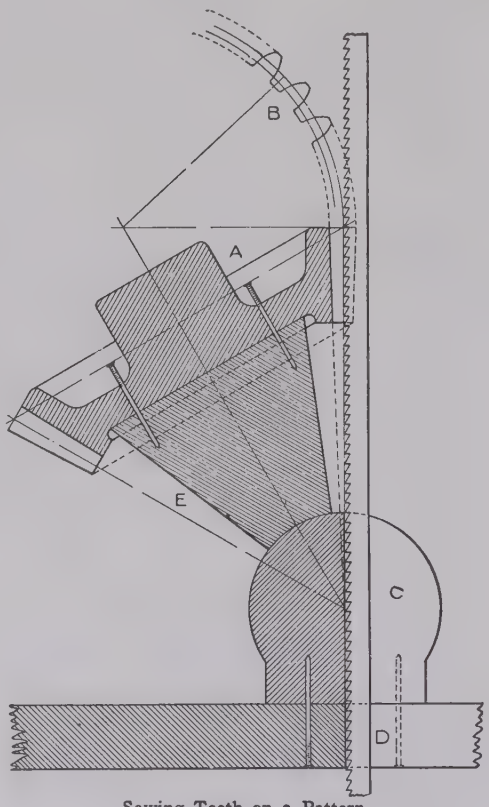
Pipe Holding Jaw for a Vise

Where a limited amount of pipe cutting and threading is done the tool illustrated is a very good substitute for a pipe vise. It is made of steel to fit the jaw of an ordinary vise, and it has two half round grooves cut for holding the pipe in two positions. Teeth may be cut in the grooves for gripping the pipe.—Contributed by C. Purdy, Ghent, Ohio.



Cutting Gear Teeth in Patterns on a Band Saw

A device whereby the teeth in bevel gear patterns can be cut on the band saw, is shown in the accompanying sketch. With this device the teeth can be cut much more accurately and quickly than shaping them by hand. Having the blank gear pattern, A, turned to the proper size, lay out the teeth on the pitch line as shown at B. Turn up a round ball, C, in the lathe,



Sawing Teeth on a Pattern

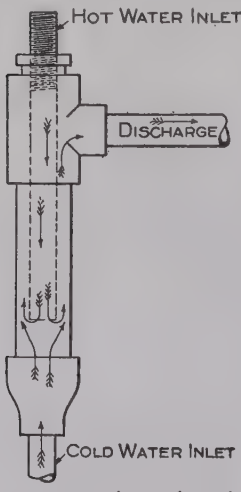
and fasten it to a board, D, with nails as shown.

Turn up a cone, E, of the proper length and hollow out one end to fit this ball. Fasten the blank gear to the cone, being careful to get it exactly in the center. Saw through the board and fasten the board to the saw table in this position. By holding the cone ball to the exact center of the ball and against the ball the teeth can be sawn out according to the layout on the blank. This device is also very handy for making experimental wooden gears.—Contributed by J. C. Hansen, Chicago, Ill.

It is best to carry a plan of the wiring system on your automobile. The owner of each car can draw up such a plan, if the manufacturers do not supply one with each machine.

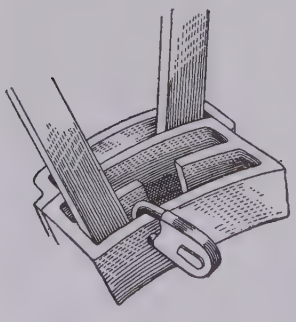
Hot and Cold Water Mixer for Shower Baths

Did you ever take a shower bath and have the temperature of the water just right for a time, and then suddenly get a dash of either cold or hot water? This is caused by the improper mixing of the hot and cold water. Good mixers are expensive, and therefore few baths in private homes are equipped with them. The mixer shown in the accompanying sketch requires very little explanation. All that is required is one reducing coupling at the bottom, a reducing tee at the top and an inside pipe with a long thread as shown in the illustration by the dotted lines. The cold water entering the bottom meets the hot water descending and both are properly mixed when they leave the discharge.—Contributed by James E. Noble, Toronto, Canada.



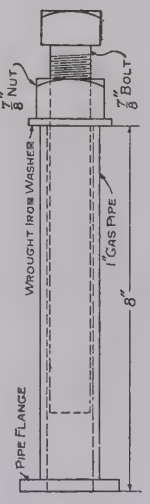
Locking a Motor Car

Owing to many motor car thefts which have occurred recently in various parts of the country it behooves every owner to adopt some plan for locking his car. A good method, illustrated herewith, consists of drilling a hole through the side of the quadrant in which the gear shifting lever operates, so that when the padlock is in place as shown, the shifting lever cannot be disengaged from the slot in which it rests. In this case the gear shifting lever is confined with the reverse gear in mesh, so that the car can only be run backward, says Motor Age. On some cars the lever can be locked in the neutral position so that it could not be run at all under its own power, but it could be readily taken in tow. Special lugs have been fitted to the gear-shifting levers and quadrants on some cars for this purpose, and almost any car with a gate type quadrant can be rendered nearly theftproof by anyone as above described.



A Home-Made Jack Screw

The accompanying sketch shows a small jack which is cheap, simple and quite useful in the shop. All that is required is a ⅞ by 8-in. bolt, one washer, a piece of 1-in. gas pipe, 8 in. long, and half of a 1-in. pipe flange. It is astonishing how much this little jack is capable of raising, says a correspondent of the Practical Engineer. It does not require over 10 min. to make.



How to Repair Steel Tapes

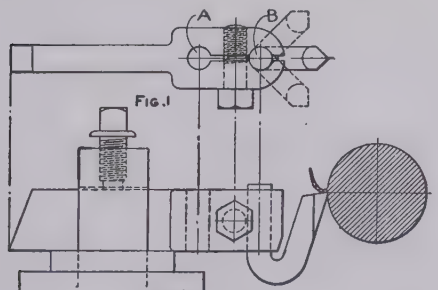
The ends of the tape left by the break must be straightened out with a pair of pliers and joined together, end to end, so as to leave the length unchanged, says Engineering News. Bend a strip of tin ½ in. wide around the joint and clamp it down firmly with the pliers. Put a few drops of soldering acid solution and a small piece of solder on the joint; hold over a burning candle or any small blaze until the solder melts. A small pine stick may be used to spread the solder and make it run into all the seams.

A field repair outfit to be carried in a civil engineer's transit or level box is made up of a vial of soldering acid, solder, a small pair of steel pliers and a few old tin can seals. The soldering acid can be made by dissolving zinc in muriatic acid to saturation. With these conveniences a civil engineer can keep his tapes in good repair.

An Adjustable Lathe Tool Holder

The accompanying illustration shows a lathe tool and holder I have been using for the past year with success. The holder is forged to the proper size for the tool post and two ⅜-in. holes, A and B, drilled ¾ in. apart. The two holes are connected by cutting a slit with a hacksaw using two blades. This allows the metal to spring enough for holding the tool secure with the screw. The cutting tool is made of a piece of round tool steel the same size as the diameter of the hole drilled in the holder. The proper shape of the tool is shown in Fig. 2. The screw should be made of ⅜-in. steel. It is not necessary to change the tool post to adjust this tool. The different positions can be obtained as shown in Fig. 1 without having to use several tools.

This tool makes an excellent thread cutter and one that will give the desired pitch with little adjustment. The entire tool when finished should be

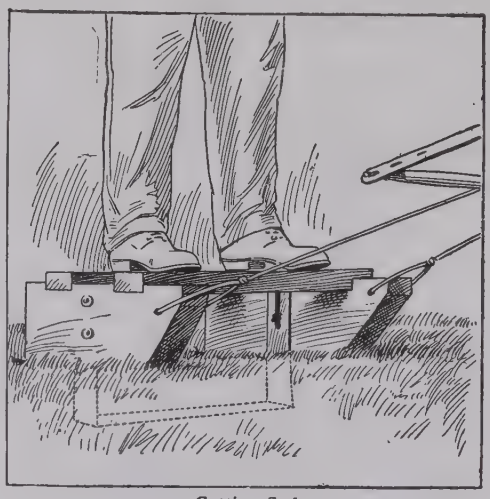


Tool Can Be Used in Different Positions

about 3½ in. long. A very good plan is to have a number of cutters made, each having a different cutting point. —Contributed by J. N. Bagley, Webber, Kan.

Cutting Soil for Sodding

The construction of the sod cutter is clearly shown in the sketch. It may be well to add that the knife blade



Cutting Sod

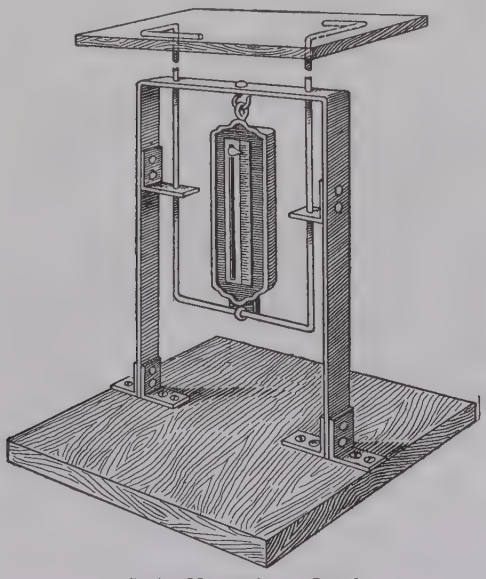
dips downward about ⅜ in. in its width of 2½ in. The knife can be adjusted to cut the sod at the proper thickness. Two men and a boy with a team cut enough sod to load a slat wagon holding 1¼ cu. yd., rolled the sod, and loaded the wagon in a trifle over an hour. The cutter is easily and cheaply made, and is a great improvement over the spade.

Temporary Automobile Tire Repair

A motorist had a bad blow-out in one of the front tires of his machine when out in the country, and not having an extra shoe along to make a change, he called on a farmer and secured a quantity of oats and a small piece of an old feed bag. The injured tube was removed and the shoe stuffed tightly with oats, the piece of bagging being placed on the inside of the shoe to prevent the oats from coming out. In this way he was able to drive to the city garage without running the car on the rim and further injuring the shoe. This would probably work only on the front wheels.—Contributed by Donald A. Hampson, Middletown, New York.

Platform Scale Made from a Spring Scale

The scale as shown in the sketch was made to weigh articles that could not be hung on the hook of a spring



Scale Mounted on Stand

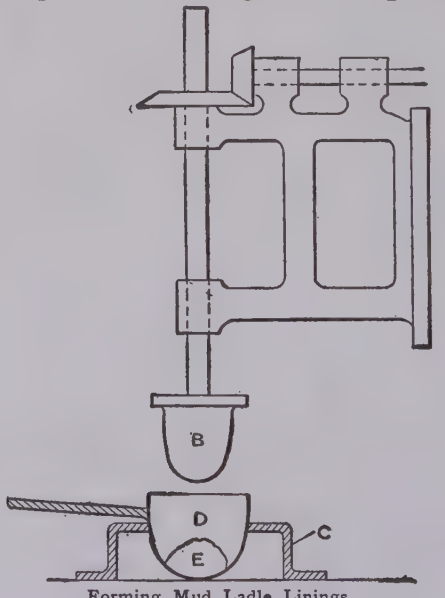
scale. The base of the scale is made from a piece of board 8 in. square to which is attached a frame made of strap iron, 1 in. wide, whose uprights are 11 in. high. The top part of the frame is 6 in. wide. A hole is drilled in the middle of the top piece and the hook taken from the spring scale fastened into it. The spring scale is hung on this hook.

The lower part or movable shaft of the spring scale is attached to a U-shaped piece of ¼-in. wire whose uprights are 10 in. high and the crosspiece 4 in. long. The upper ends of the wire are bent as shown by the dotted lines and attached to a board ½ in. thick and 6 in. square. The length of the wires between the top board and the top of the iron frame should be a little longer than the distance traversed by the needle over the face of the scale. The uprights of the U-shaped wire run through guides riveted to the frame and through the top part of the frame as shown. Adjust the pointer to zero and the platform scale is ready for use.—Contributed by John Blake, Franklin, Mass.

Daubing Foundry Hand Ladles

In a certain large cast-iron soil-pipe foundry, where it formerly kept three men busy "daubing" ladles, the superintendent has introduced a cheap machine to do the work so that now one man can in one hour daub all the ladles required for the day's work.

The cut shows the device. An old fashioned drill press was bought second hand. The spindle has a travel of about 13 in. and is provided with a simple lever feed, not shown. To the end of the lever the turned cast-iron former, B, is fastened. This former is made the shape of the inside of the finished daubed ladle, says the American Machinist. The spindle and former are counterbored. A roughly made iron centering device, C, centers the ladle D. A piece of loam, E, is put in the bottom of the ladle and the quickly rotating former is brought down against



Forming Mud Ladle Linings

it. The surplus loam is forced up the sides and over the edge. The finished daubed ladles are much neater in appearance as the work is more uniform than hand daubing.

Aeronaut's Hot-Air Balloon

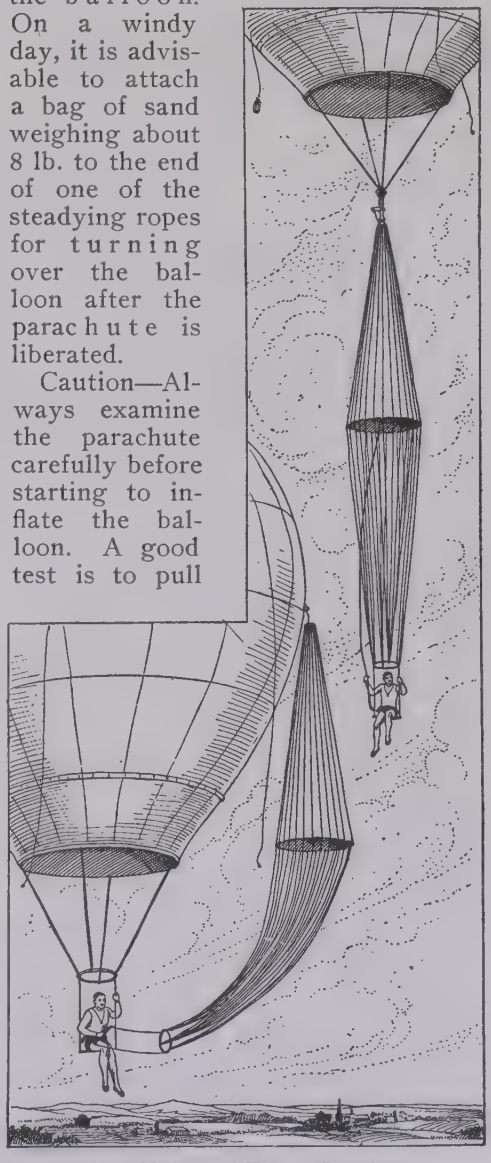
Part III—How to Descend in a Parachute

The first description is for the "leap-off" method. When the balloon is filled as described in a previous chapter, fasten a ring 2 ft. in diameter to the ends of the four 12-ft. ropes attached to the ring sewed into the cloth at the bottom end of the balloon. Attach a trapeze to this lower ring with two side ropes each about 3½ ft. long. Attach the parachute top to a small ring that has been fastened half way up the side in the cloth of the balloon for this purpose. Tie it to the ring with a cord or string that will break with a weight or strain equal to about 75 lb. The parachute described in a previous chapter will weigh about 35 lb., if made of the same material as the balloon. The cord or string will hold the parachute until the aeronaut makes his leap. The extra weight applied breaks the cord or string and the passenger drops rapidly until the parachute opens. The balloon, being relieved of its weight soon turns over, empties the hot air, and then drops to the earth. When using this "leap-off" method it is necessary to fasten yourself securely to the trapeze of the balloon for safety.

When using the liberating knife the four 12-ft. ropes attached to the ring fastened in the cloth at the lower end of the balloon are tied into a loop. Pass a strong cord through this loop and through the knife hole in the liberating knife and tie securely. Fasten the parachute top to the bottom of this knife. Fasten a cord to the handle of the knife blade and pass the loose end through the hole in the top and down inside of the parachute within easy reach of the aeronaut sitting on the trapeze.

When the altitude desired is reached the cord is pulled to cut the fastening cord and the parachute drops rapidly until it opens. Then you descend to the earth slowly. This is the safest method of the two as you ascend fastened to the lower part of the parachute, the parachute attached beneath the balloon. On a windy day, it is advisable to attach a bag of sand weighing about 8 lb. to the end of one of the steadying ropes for turning over the balloon after the parachute is liberated.

Caution—Always examine the parachute carefully before starting to inflate the balloon. A good test is to pull



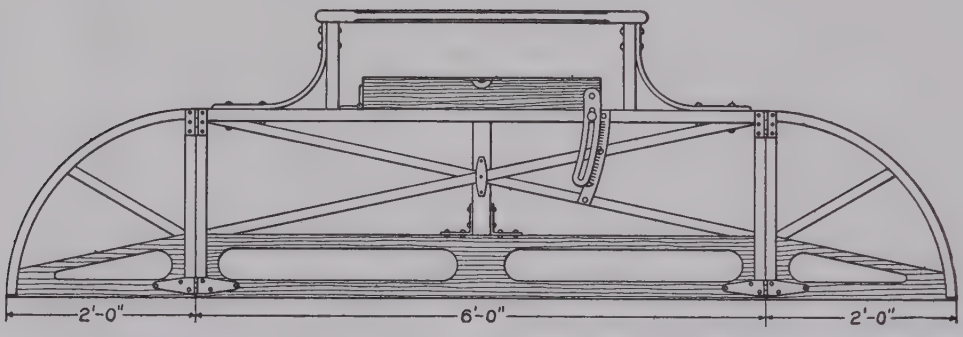
Two Methods of Using a Parachute

the cords and cloth against the wind allowing it to open to its full extent. Be careful to see that the parachute cords are straight and not tangled when at-

taching it to the balloon. When using the last described method of attaching the parachute to the balloon always look above your head and see that the cords are straight and not twisted around under the cloth end. Sometimes the cords become twisted as you ascend. If you cannot get them straightened while in the air do not cut the parachute loose.

A Grading Level

A handy tool for general leveling and for grading streets, or for setting curbs, pipes, ditches and the like to any desired grade, is shown in the accompanying sketch. It is so simple as to hardly need a description, says a correspondent of the Engineering Record. A light, rectangular frame of wood, stiffly braced, has for its lower member a board 8 in. wide and 6 ft. long, with framed end pieces, each 2 ft. long, hinged as shown. When extended the board is 10 ft. long and held in position by latches, not shown in the sketch. The lower edge of the board is shod with a thin strip of steel. It can be used with greater ease, speed and accuracy than the ordinary leveling board.



Level as Well as Degree of Elevation Can Be Found

Centrally located on its upper member is a carpenter's level, hinged at one end and provided at the other end with a pointer and set screw which passes through the slot of an arc in the pointer. The pointer shows on a fixed graduated plate the degree of elevation, in inches per hundred feet, or the per cent of grade required. Above the level is a handle for carrying it from place to place, but the handle may be dispensed with if used in a low tunnel or other confined place.

The apparatus can be constructed in a short time by any good carpenter.

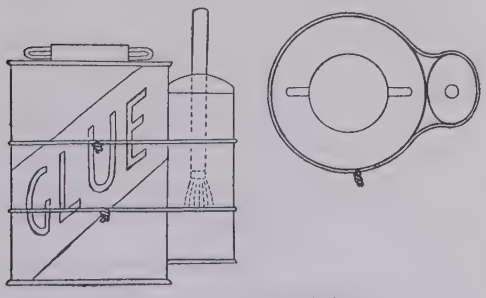
Varnish on Automobile Bodies Spoiled in Washing with Soap

The use of needlessly strong alkali soap in cleaning automobiles, neglect to wash off the soap and failure to dry the varnished surface perfectly are probably responsible for more damage to paint and varnish than all other causes combined, says Automobile Dealer and Repairer. As a matter of fact, neither soap nor water should ever be used on an automobile above the under sides of the mud guards, except in cases where the mud is caked on the body in large quantities. In most cases the first signs of wear on the painted portion invariably show on the varnished portions of the engine bonnet. This is due to the fact that it is frequently covered with mud on the return from a run and is then washed with soapy water while the metal is still hot. Soap should not be used on the bonnet until it has cooled.

¶It is not economy to save emery wheels by neglecting to keep them true and sharp.

Glue Brush Holder

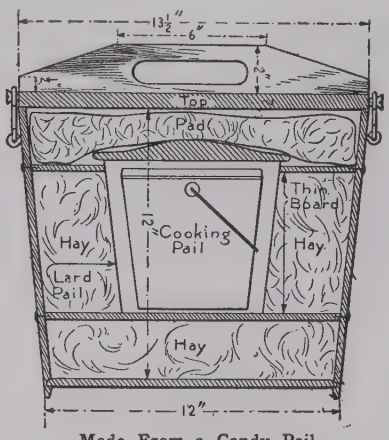
Many a small shop uses glue in quantities too small to necessitate a regular equipment of melting-pot, double boiler, etc. In such cases liquid glue proves a handy and efficient substitute. The small "trial size" bottle, with the brush fitting through a metal cap which replaces the drawn cork, is too small, and on the larger size the cap is so big that it would be cumbersome if used in this way. As a result the brush, or wooden paddle which is sometimes used, becomes hard with stiffened glue. Illustrated herewith is an attachment which may be quickly made and which will keep a brush at all times soft and clean. It consists of a long narrow tin case, such as is used for holding a small bottle of liquid courtplaster, etc., wired to the glue-pot. The cover of the tin case is perforated and the brush handle stuck through. The little "burrs" around the edges of the hole are then bent down close to the brush, which grips firmly and makes a watertight connection. This case is then filled with water. If the case leaks and no solder is handy, a little melted beeswax poured inside will stop all the cracks.—Contributed by C. W. Nieman.



Keeps the Brush Soft

Home-Made Fireless Cooker

A practical fireless cooker, as shown in the illustration, can be made by using a common candy bucket, two lard pails—or any vessels having clinched lids. Place chopped hay or straw in the bottom of the bucket over which put a piece of composition board or a thin piece of box board cut round to fit the inside of the bucket. Insert the lard pail and pack chopped hay around



Made From a Candy Pail

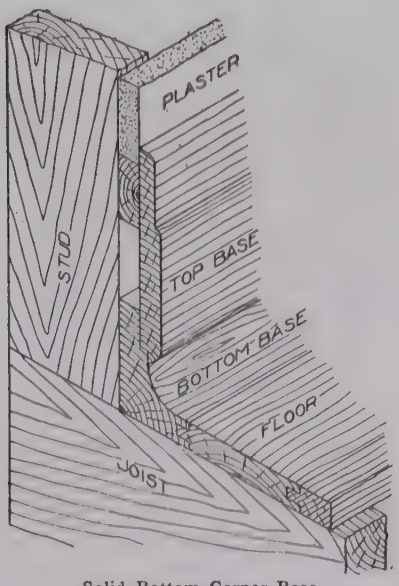
it. Lay another piece of composition board over this, having first cut a hole through it for the top of the lard pail. Force the composition board down over the hay and hold it in place by tacking through the sides of the bucket. Make this piece flush with the top of the lard pail.

Make a pad out of a piece of carpet or other heavy material and stuff it with hay to cover over the vessels. The top of the candy bucket should be fastened to the sides with three hooks and eyes. A handle may be screwed to the lid of the bucket which also serves as a cleat to keep the lid from warping. The lard pail in which the food is cooked, before placing in the cooker should be smaller than the one remaining permanent in the bucket and the bail, if too large, may be cut off and reset in the sockets. The time for cooking foods as applied to commercial fireless cookers should be used, and the results will be exactly the same. The cost of making such a cooker is practically nothing.—Contributed by Harry Sowden, Colome, S. D.

¶Emery wheel arbors should be fitted with flanges or washers having a slight concave to their face.

A New Type of Baseboard

In finishing the interior of dwellings the right angle corner formed by the baseboard and the floor, either with or



Solid Bottom Corner Base

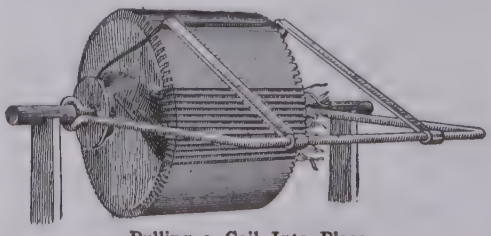
without a quarter round, has never been quite satisfactory. The square corners catch the dirt and the pieces forming it have a tendency to warp and form cracks. The accompanying sketch shows a new type of a two-piece baseboard which entirely eliminates these troubles. The lower piece joins the flooring and is laid with it, while the top piece is put on after the interior is finished. When complete it has a very neat and pleasing appearance, and it is also sanitary.—Contributed by F. W. Haglock, Akron, Ohio.

A Temporary Repair for a Broken Lamp Glass

If the glass of the tail lamp breaks, there are two ways by which immediate progress is rendered possible. The first is to procure a sheet of thin red tissue paper at a stationer's and to tie it over the frame which held the glass. As there is no head draft against the tail lamp, this is practicable, says Automobile Dealer and Repairer. A second method, which applies to any lamp on the car, is to get a sheet of thin paper, double it, grease it, and lash it over the lamp front with a wire. This is sufficiently transparent to allow of legal limit traveling with a single acetylene headlight, and at this pace a double layer of the paper is windproof for a good many miles.

Armature Coil Puller

The accompanying illustration shows an armature coil puller which has been found a convenient device for building armatures. The bar upon which the hooks are placed are of cold rolled steel, while the hooks are of flat strips of iron. The hinged loops at the ends of the bar are slipped around the armature shaft as shown, the pinion on the shaft being held rigidly by a double-jawed spanner. The hooks then grip the coil from the inside, and a downward pressure on the bar pulls the coil into position. Where the coils are very thin, consisting of but one layer of wire, a split hook will be found advantageous, says the Electric Traction Weekly. To protect the coils as they are being drawn over the slots, a strip of sheet iron 3 or 4 in. wide is bent to fit the surface of the core, being allowed to project over the sides ¼ in. This will effectually guard the coils from injury. No dimensions are here given, as it is advisable to make the puller to fit the work on which it is to be used. One thing to be observed,

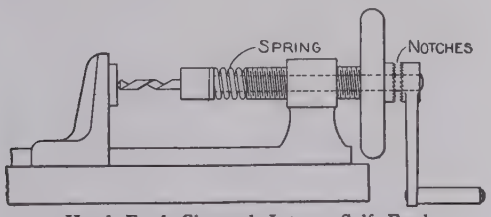


Pulling a Coil Into Place

however, is that the length of the hooks from the centers on which they swing should be the same as the distance from these centers to the center of the armature shaft.

Self Feed for a Hand Drill

The one disadvantage of the ordinary blacksmith's hand drill is the lack of a self feed, and especially so when it is necessary to hold the article being drilled with the free hand. To overcome this difficulty I designed the device shown in the sketch. I secured a coil spring about 1 in. long and placed it on the shaft between the chuck and the feed screw. I cut notches in the hub of the hand wheel and corresponding notches in the hub of the crank. When the pressure of the bit on the piece being drilled becomes too light the spring draws the crank into contact with the hub of the hand feed wheel and the teeth meshing causes the feed wheel to revolve until the



Hand Feed Changed Into a Self Feed

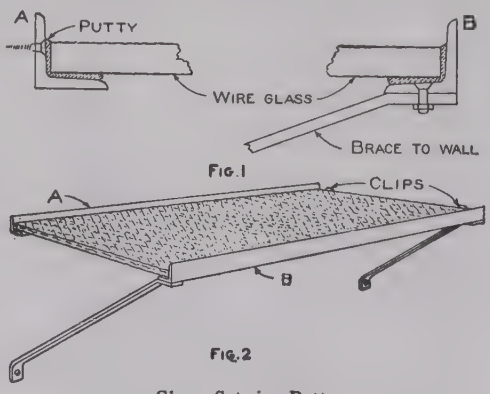
pressure of the drill pushes the crank free again. The spring also causes a more even cutting pressure.—Contributed by Thos. L. Parker, Olaf, Ia.

Home-Made Glass Drip Board for a Sink

The glass drain board shown in the accompanying sketch has several advantages over the ordinary kind, the principal one being that it prevents insects from hiding on the under side.

The drain board proper is of ⅜-in. wire glass, such as is used in fireproof buildings, set in angle irons as shown. The angle iron A is fastened to the wall with screws. The outside angle iron B is held in place with two braces of iron bent as indicated. The glass is set in putty placed in the angle of the irons. This is shown in Fig. 1. The complete drain board is shown in Fig. 2.

The strength of the glass is sufficient to stand ordinary usage, but care must be taken not to set very hot pots on it. Plate glass can be used instead of

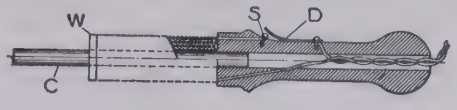


Glass Set in Putty

the wire glass but the thickness should not be less than ½ in. The wire glass is the best to use.—Contributed by A. P. Connor, Washington, D. C.

A Lifting Magnet

A handy little magnet that can be used for lifting small objects out of holes, etc., is shown in the accompanying sketch. The core, C, is made of ¼-in. diameter soft steel. The wood handle has a ¼-in. hole through its center in which one end of the core is driven. A fiber washer is placed on the core in the position shown and the space between it and the handle wound with No. 26 single cotton-covered wire. Fasten one end of the wire under the head of the screw S and connect the other to the battery. The return wire is fastened to the spring D, which is held in position by a screw. By pushing down on the spring

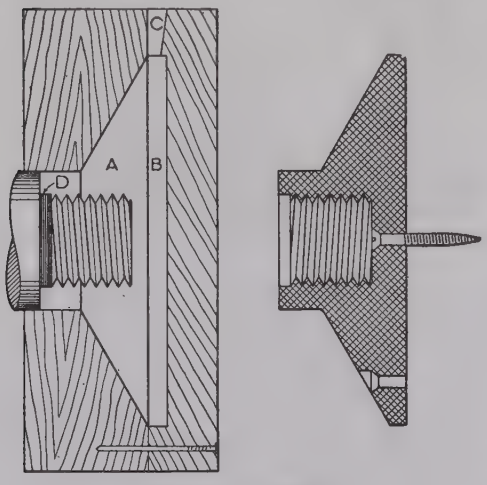


For Lifting Objects from Holes

with the thumb the circuit is completed and the core magnetized. This little magnet will prove very useful on a toolmaker's bench.—Contributed by C. G. Smith, Brooklyn, N. Y.

Faceplates Made of Babbitt

Many pattern-makers and woodworkers are using faceplates made of babbitt on their lathes, instead of the



Mold and Faceplate

usual iron ones. They are easy to make and give as good service as the others.

Make a temporary faceplate by boring a hole in a 2-in. piece of plank and screwing it on the lathe spindle. Upon this the two pieces A and B, shown in the accompanying sketch, are shaped. Fasten the two together with nails or glue, thus forming a mold. Bore a hole, C, at the top for pouring and venting. Wrap some string tightly about the spindle at D as shown, then adjust the mold in place. After pouring remove the mold, turn the faceplate true, and bore holes for the screws. Any number of plates can be taken from this mold, and by slightly changing it several different designs can be made. —Contributed by P. H. Campbell.

Engineers' Stethoscope

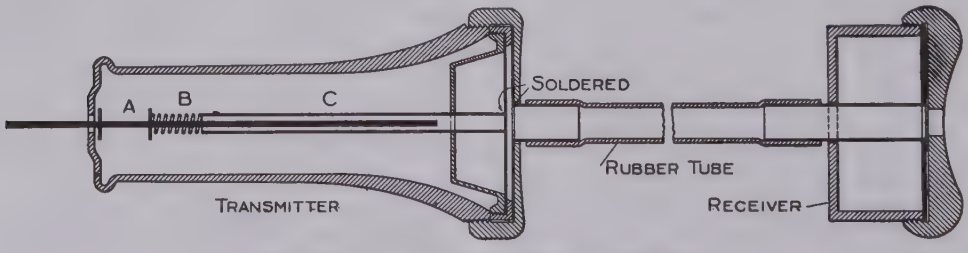
The majority of engineers are, no doubt, familiar with the physicians' stethoscope, the little instrument which is placed over the heart or lungs of a patient for the purpose of discerning any irregularities that may be present more clearly than would be possible with the ear alone. The instrument is primarily an intensifier.

A useful instrument, which for lack of a better name we shall call a stethoscope, is being used to advantage by many practical engineers, says a correspondent of Power.

By its use the engineer can more readily detect existing errors than is possible by means of the ear. Its use has been found valuable in detecting loose follower bolts or nuts, broken snap rings, leaking pistons, etc. In the examination of flywheels for fractures or loose bolts it is also found useful. The mere ring of a hammer blow is oftentimes deceptive when the unaided ear is depended upon to catch the sound.

Engineers sometimes put one end of a pencil or rule between their teeth and hold the other end against a water or steam line to determine if the flow is normal. The same principle is made use of in the stethoscope.

The material for its construction can be obtained for practically nothing at a telephone exchange. New material is not necessary, as old, slightly-cracked receiver shells will answer the purpose. The accompanying sketch shows the detail construction of the apparatus. The rod A is placed against the cylinder, water pipe or flywheel



Instrument for Detecting Errors in Machinery

rim, while the small receiver is placed to the ear. Better results will be obtained if two small receivers are used. The connections are made of ¼ or ⅜-in. rubber tubing.

The small spring B is inserted between the rod A and the tube C to prevent pressing the rod A so tightly against the object being tested that slight vibrations cannot be detected. The faint sounds caused by the existing error are transmitted through the rod and tube against the regular telephone receiver diaphragm. The sounds, here intensified, are conducted through the tube connections to the diaphragm in the small receiver.

Any engineer can make this instrument during spare time, and its regular use may save serious accidents.

Handsaw Guard

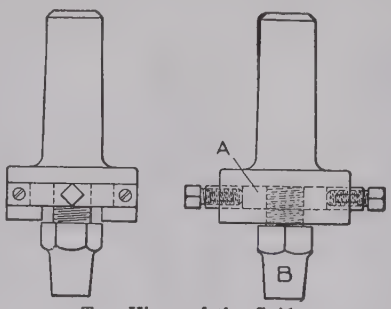
The accompanying illustration shows a guard to place on handsaws for carrying them in crowded streets and cars. The guard also prevents injury to the teeth when the saw is placed in with other tools. It is made of a small grooved stick, four large

Protecting the Teeth

rubber bands, four screws, a piece of wire and some washers. The wire is bent in such a way as to fit over the back of the saw blade and have two loops on each side for the rubber bands. The guard can be slipped on and off the saw quickly.—Contributed by W. A. Jaquythe, Richmond, Calif.

An Adjustable Guide Pin for Profiling Machines

When using the pin as shown in the accompanying sketch, it is not necessary to have a set of extra pins on hand in case the cutter has to be ground, which makes it smaller. The nut A fits in the slot and carries the pin B, which screws into it with the end up against the top of the slot, then locking it in place. The two set screws are for ad-

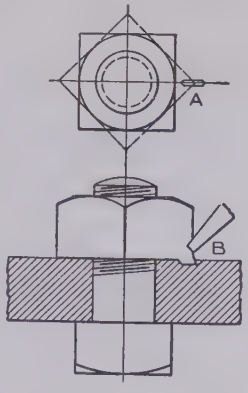


Two Views of the Guide

justing the nut lengthwise of the slot. If a cutter is ground, making it somewhat smaller, the distance between it and the guide pin can be adjusted so that it will cut the same profile as before grinding. This device is an improvement as one adjustable pin serves the purpose of a set of solid ones. The pin is used for duplicating irregular shaped models on a profiling machine. —Contributed by G. E. Quinn, Hartford, Conn.

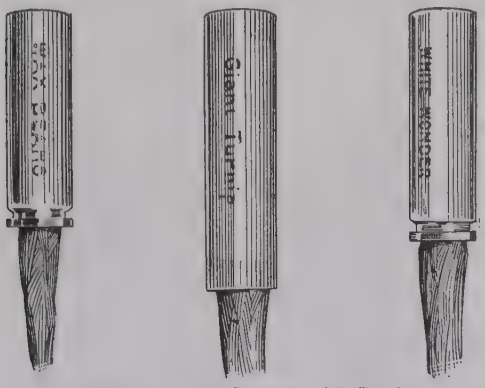
A Simple Nut Lock

There are a great many devices for locking nuts, but the one shown in the accompanying sketch is about as simple and effective as any of them. Screw the nut up to the desired tightness and mark the position of one of the corners, then loosen it a little and make a slot in the metal with a sharp chisel as shown at A. Tighten the nut again, then force the corner of the nut down into this slot by striking it with a punch, held as shown at B. This will hold the nut securely in its place.—Contributed by W. Parker, Olaf, Iowa.



Permanent Shrubbery and Vegetable Garden Labels

In endeavoring to secure a permanent label which would be at the same



Names on Paper Covered with Bottles

time cheaply and easily prepared, the following plan was hit upon. First secure a sufficient number of small bottles with corks, says House and Garden. The small tubes that prepared photographic developers come in will do, or one or two drachm homeopathic vials may be secured at your local drug store. Wire and some small stakes with one end trimmed down to fit the necks of the bottles, complete the equipment. Copper binding wire is best as it is very pliable and does not corrode when exposed to the weather.

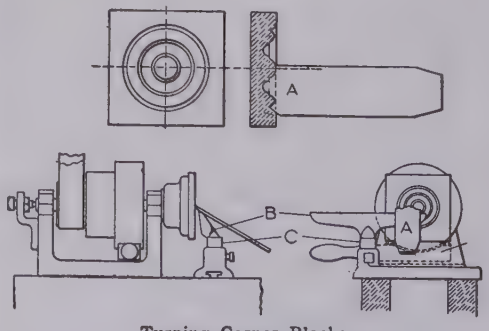
For the seed bed, clip from the end of the seed package the strip bearing the name of the variety planted, slip this into the bottle, cork tightly and wire to a stake at the end of the row. Or if desired, the bottle may be slipped over the end of the stake as shown in the sketch.

Tool for Turning Corner Blocks

The smaller wood-turning mills often receive rush orders for from 200 to 300 corner blocks of a special design, for interior finishing, to be turned up by hand. It would not be profitable to order this amount in a machine-made block. If these blocks are turned by hand with chisels it is very slow work and the profits are small. The accompanying sketch shows an improved chisel or cutter by the use of which the work can be turned out quite rapidly. This cutter is made out of a plane bit and has the cutting edge ground to suit the design of the block.

Carefully turn up a sample block, then saw it in half and grind the cutter to fit the outline of the block as shown in the upper sketch. A cutter should be made for each design of block. These cutters should be about ¼ in. wider than the cut desired so they will overlap on each side. The bevel should be slightly longer than that on a plane bit and in grinding it be careful not to burn the edge, or the temper will be drawn. Finish the edge with a slip-stone. If carefully made and of good material, this cutter will turn up from 500 to 600 blocks without regrinding, and will require only occasional sharpening with the slip-stone.

The manner of using this cutter is of as much importance as its making. If it is forced straight into the work it will chip the bead and tear the corners of the block. The proper way to use it is to set the steady rest, B, slightly below the center line so that the cutter will lay at an angle of about 30 deg. from the horizontal. Place the left hand on top of the cutter and hold it firmly on the rest, grasp the rear end with the right hand and make a light cut straight in; then move the rear end of the cutter back and forth, using the cutting edge as a fulcrum,



Turning Corner Blocks

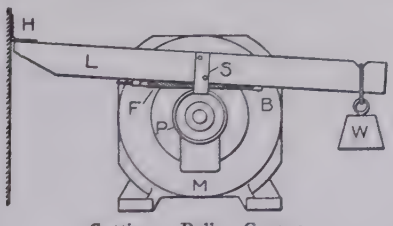
and at the same time forcing it into the work. This method will cause the tool to shave out the wood instead of knock-

ing it out in chips. On soft wood no sandpapering will be required if the tool is sharp.

The center-rest should have a collar, C, of the right height between its shoulders so that it can be swung clear when removing the blocks without resetting. The headstock bearings should be as tight as they will run without heating and there must be no end play, otherwise the cutter is liable to dig into the work. A simple brake can be made of a piece of hard wood, cut to fit the largest pulley on the headstock, and covered with a piece of belt leather. By using this brake the lathe can be stopped quickly, thereby saving much time in taking off and putting on blocks. The lathe should run at about 2600 or 2700 R. P. M., which is the fastest speed of most lathes. About 600 blocks a day can be cut with this tool which brings the cost down to a figure that compares favorably with machine-made blocks.—Contributed by J. H. Wyatt, Philadelphia, Pa.

How to Groove a Motor Pulley

As I wished to make a grooved pulley out of the flat-faced one on my motor, I rigged up the device shown

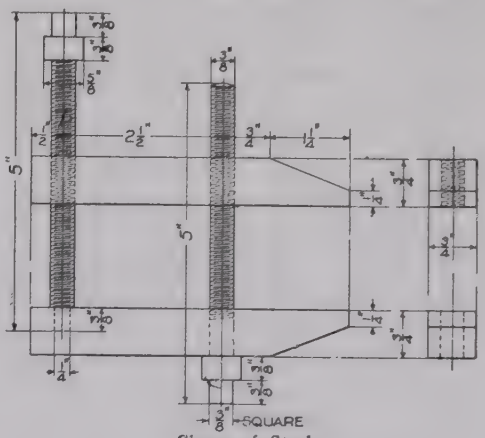


Cutting a Pulley Groove

in the accompanying sketch to do the work. The lever, L, is a piece of wood as wide as the pulley face. One end is hinged to the wall at H, and the other is notched for attaching the weight W. Under this lever I fastened a rat-tail file, F, by means of the bands B. The straps S keep the lever in position on the pulley face P, and as it turns the file cuts a round groove in it, which can be made as deep as desired.—Contributed by H. Hahn, Chicago.

A Machinist's Clamp

A cheap, handy and durable steel clamp for small work in the machine shop or about the home, that can be

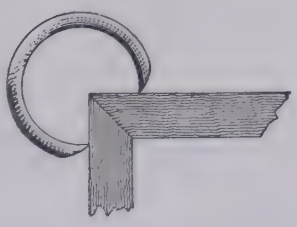


Clamp of Steel

made by the ambitious machinist is shown in the accompanying drawing. Secure a piece of cast steel of suitable size and cut off two lengths, each 5 in. long, plane them to ¾-in. square, and finish as per drawing. The screws are made of ⅝-in. cold rolled steel, and can be turned up in the lathe. The outer ends of the screws being ⅜-in. square the clamp can be operated by a ⅜-in. S-wrench.—Contributed by R. E. White, Schenectady, New York.

Clamp for Holding Mitered Corners

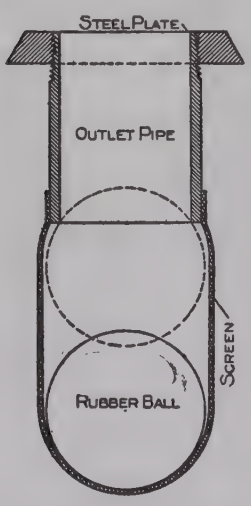
Secure enough $\frac{3}{16}$ or ¼-in. round tempered spring steel wire and make four rings 4½ or 5 in. in diameter. After the rings are formed the ends can be filed to a point on the inner surface.



They will be found very convenient in holding the corners of a frame while fitting the miters.—Contributed by D. O. Wilkins, Hempstead, Texas.

A Check Valve for a Drain

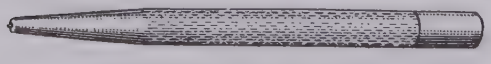
Secure a steel plate of suitable size and bevel the edge as shown in the accompanying sketch. This bevel is to hold the plate securely in the concrete floor when it is in place. A hole the size of the drain pipe should be tapped in the plate and a short piece of pipe screwed in it. Make a cage of copper wire large enough to hold a hollow rubber ball, which is somewhat larger than the opening in the pipe. The cage should be long enough to allow the ball to have a vertical movement of 2 or 3 in. and is soldered to the end of the pipe. Water will readily flow out of the drain, but if it backs up, the hollow ball will rise and stop the opening. This simple device is very handy where a heavy rain is liable to cause the water to back up in the drain. —Contributed by V. Metzech, Chicago.



A Never-Slip Nail Punch

This punch has the appearance of the ordinary kind, the only difference being the small diamond point in the center of the flat punch end. The point will hold the punch on the nail head when a blow is struck.

I once struck a punch a hard blow and the end slipped on the nail head



Diamond Point End

and the punch went through a window. I was "out" and so was the punch. I then proceeded to make a diamond point on my punch as described and I had no further trouble.—Contributed by C. Purdy, Ghent, O.

How to Clean and Care for Spark Plugs

Much of the trouble with spark plugs becoming dirty can be avoided to a large extent by not speeding or racing the engine while idle. The high speed causes the oil in the crank case to be splashed up on the walls of cylinders and into the plugs. This oil is then carbonized by the heat of the explosions, causing short circuits in the plugs. The electric discharge instead of taking place between the points of the plug, creeps across the carbon deposit, which kills the life of the spark, thus causing the cylinder to miss fire.

Much of the carbon deposit in cylinders can be avoided by giving the inside of the cylinders a bath of kerosene oil frequently. This should be done while the engine is warm, immediately after returning from a trip. Remove the plugs and squirt 1/3 qt. of kerosene into each cylinder, taking pains to squirt the oil around on the walls as much as possible. Replace the plugs and let stand several hours. Then start the engine to burn out the oil, and carbon that has been loosened. A dense smoke will issue from the muffler exhaust until all the kerosene is burned. Clean the plugs and the engine will run without a miss if the other parts are mechanically right.

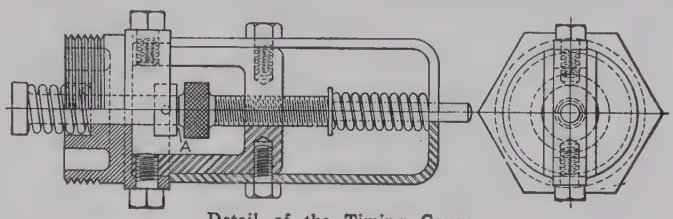
Some spark plugs are designed to be taken apart for cleaning, while others are not made to take apart, but instead are self-cleaning to a certain degree. In cleaning plugs that can be taken apart, first remove the porcelain core and brush off the carbon deposit with a tooth brush dipped in gasoline or ammonia, then scrape off all the carbon from the rest of the plug, brighten the spark points, and reassemble. Plugs that cannot be taken apart easily should be brushed out well with ammonia and the points brightened.

Most people are at a loss to know how to set spark plug points so as to get the best and most even explosions in all cylinders. After cleaning the plug parts thoroughly, screw them together. Then if you can slip a new silver dime between the points, the

distance is correct. Otherwise make the distance between the points to equal the thickness of a dime.—Contributed by C. E. F.

Valve Timing Gauge

A new design of a gas engine valve timing gauge that will prove useful to automobile repairmen is shown in the accompanying sketch. With this device the valves can be timed more accurately and with less trouble than by the old screwdriver method. The construction of the gauge is fully shown in the detail sketch. In use it is screwed into the valve plug hole in the cylinder with the lower plunger resting on the valve. Adjust the top plunger so that a thin sheet of tissue paper will just slip in between the ends of the plungers at A. Now turn the flywheel slowly and as soon as the paper is gripped by the plunger you will know that the valve is just starting to open. By turning the flywheel in the same direction until the paper is released the closing point of the valve can be determined. As the paper in question is but .001 in. thick great accuracy can be obtained with this gauge.—Contributed by C. T. Schaefer, St. Louis, Mo.



Detail of the Timing Gauge

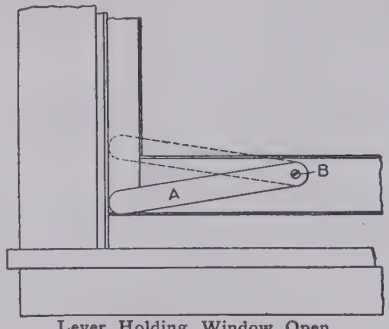
A Door Holder

Stable and woodhouse doors are very annoying when the wind blows them shut at a time they are wanted open. This may be remedied by opening the door entirely back against the side of the building and driving a nail through the door at the top and into the weather board. Pull the nail out of the board, but leave it sticking through the door. When the door is pushed back, the point of the nail sticks into the hole in the board, thus holding the door against the wind.—Contributed by Pleasant W. Dennison, Hope, Ind.

A Home-Made Window Fastener

There still remain in use many windows which are not equipped with either weights or springs, and when one wants to raise one of these a stick of just the right length never seems to be available, says a correspondent of the American Thresherman.

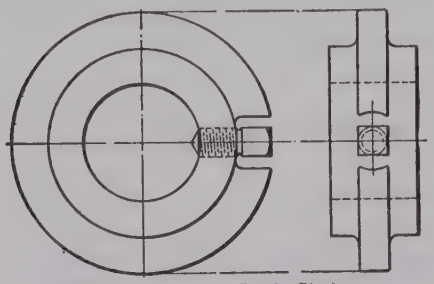
A handy and effective home-made device, which not only serves to hold the sash up at any desired point, but which will also hold it down, is shown in the accompanying sketch. It consists simply of a strip of hard wood, A, secured to the bottom sash rail by the wood screw, B, on which it swings freely. The strip, A, should be 1½ in. wide, ½ in. thick, and anywhere from 6 to 12 in. long. The screw should be at such distance from the side of the sash that, when the other end of the strip touches the window jamb, it will stand at about the angle shown. In this position it will serve to hold the sash up, and, when desired, will hold it in the opposite direction by swinging to the position shown by the dotted lines. Care should be taken to get the screw in the right place and fastened to the work solidly, as the successful operation of the device depends upon having the screw of good size and properly put in.



Lever Holding Window Open

Safety Collar

Many bad accidents are caused by the heads of setscrews in collars catching in workmen's clothing. These could be avoided if collars of the design



Setscrew Cannot Catch Clothes

shown in the accompanying sketch were used in dangerous and exposed places about machinery. A supplementary flange or collar is cast on to the ordinary collar, which has an opening for a setscrew. The collar presents a neat appearance on a shaft, is perfectly safe and also inexpensive.—Contributed by D. A. Hampson, Middletown, N. Y.

A Substitute Stop Cock

An inexpensive stop cock is often desired on steam or water pipes to serve as an air or exhaust valve. Where

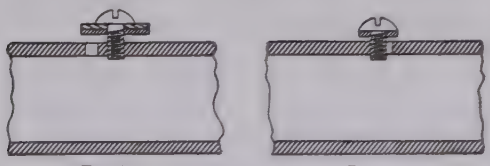


FIG. 1 FIG. 2

Two Kinds of Air Vents

there is no petcock handy, a good substitute can be made as follows: Drill a ⅛-in. hole through the side of the pipe in a convenient place. About ¼ in. from this hole, drill and tap another hole of the same size. Secure a brass machine screw to fit the threads and solder close to the head a brass washer ⅝ in. in diameter. Next to this place a rubber washer of the same size. By tightening or loosening the screw the valve is closed or opened, as shown in Fig. 1. Another method along the same line is shown in Fig. 2. This necessitates the drilling of only one hole, which, after being tapped, is filed away in a notch as shown. No washer is required when using this plan.—Contributed by C. W. Nieman, New York City.

A Screwdriver for Headless Setscrews

In a large textile machinery plant where there are thousands of headless setscrews used they have a screwdriver like the one shown in the accompanying sketch, says a correspondent of American Machinist. Anyone who has ever had a quantity of screws to put in will appreciate the fact that with this screwdriver it is not necessary to hold the fingers at the end of the screwdriver to prevent it from slipping out of the slot. It

Hold a Screw While Turning

also sets each screw to a determined depth, according to the location of the pin. About twenty ¼ by ¾-in. screws can be run in flush with the casting in one minute with this device.

Correct Air Pressure for Automobile Tires

For the purpose of informing car owners as to the proper pressure to be used in the inflation of tires in proportion to the weight carried, a manufacturer of rubber tires has compiled the following table. The weights are for cars unloaded. For weights exceeding 1,000 lb. per wheel, 5-in. tires and over are recommended.

Size. Inches.	Wt. per Wheel. Pounds	Air Pressure Recommended Pounds
28 to 36x2½	225	40
28 to 36x3	250	60
28x3½	400	60
30x3½	450	60
32x3½	550	60
34 and 36x3½	600	60
30x4	550	75
32x4	650	75
34x4	700	75
36x4	750	75
32x4½	700	85
34x4½	800	85
36x4½	1000	85
36x5		90

SHOP NOTES

Emergency Repair Outfit for Motorboats

The following outfit of repairs should be carried on every motorboat and yacht. A leak that would sink a boat in a few minutes can be quickly repaired if the necessary tools and materials are at hand. The outfit should contain the following articles:

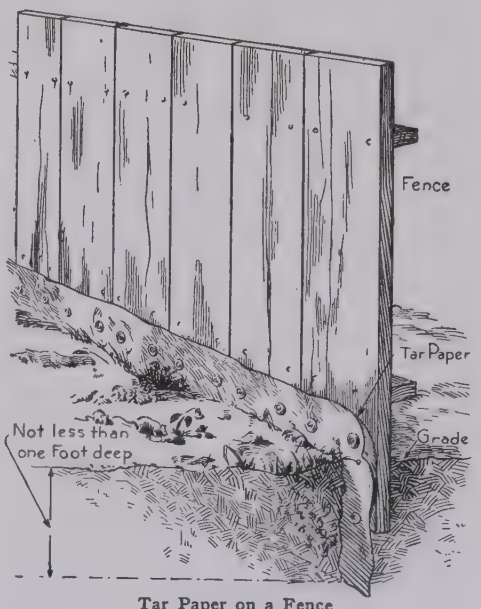
2 yd. heavy canvas.
5 lb. oakum.
5 lb. mutton tallow.
2 lb. shingle nails.
1 package of large carpet tacks.
1 piece of pine, ½ by 12 by 18 in.
1 piece of pine, ¼ by 12 by 18 in.
1 sharp hatchet.

Carry the lumber, oakum and canvas in the shape of a cushion with the two boards as a base and the oakum on top. The canvas wrapped around the whole will form a cover. It should be slightly fastened with a string so it can be easily opened in case of accident.

Place the hatchet, tallow, tacks, nails and canvas cushion where they may be easily found. Should the boat spring a leak or be snagged below the water line, cut away the ceiling, flooring or whatever is necessary to reach the hole from the inside, then place a "soft patch" over the opening. Cut a piece of the ½-in. board the right size to cover it. On one side of the board tack two thicknesses of canvas, and, if the canvas and board will not fit flat against the planking and make a tight-fitting cover, place oakum between the canvas and the board, and nail the patch over the hole. If the hole can be reached from the outside, insert oakum and daub it over thoroughly with tallow. If the hole is small it can be stopped with oakum and tallow until the soft patch can be prepared. If the hole is large use a pillow or piece of blanket. Should the hole be above or just at the water line, tack a good sized patch of canvas on the outside of the hull, using battens made of the ¼-in. board, fastening them with the shingle nails.—Contributed by John P. Cowing, Chicago.

Tar Paper Keeps Out Vermin

A cheap way to keep rats, mice and ants from gnawing their way through a wall or fence is to tack some tar



Tar Paper on a Fence

paper on the place where they are liable to enter. If it is a solid board fence put the paper on the bottom and let it extend into the ground, as shown in the illustration. This class of vermin will not gnaw through anything saturated with tar. The tar paper can be used to keep out most vermin in addition to the advantages of waterproofing and preserving the wood.—Contributed by A. P. Connor, Washington, District of Columbia.

Combination Hinged and Roller Doors for a Garage

The owner of a private garage wished to have the doors so arranged

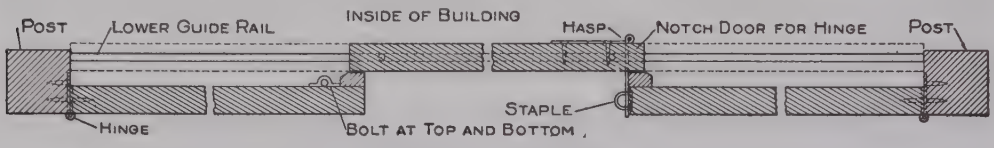


Fig. 1—Three Doors on a Garage

that he could open two-thirds of the front at once and on either side. This required three doors, and as there was no chance to slide all of them, two were hinged and one made to slide, as shown in Fig. 1. The middle and inside door was hung on an overhead track and could slide to either side of the opening. The two outside doors were fastened with hinges to the posts as shown. An inverted trolley track was placed in the cement floor under the middle door as shown in Fig. 2. Two lag screws were screwed into the bottom of the door and their heads cut off, leaving the stem projecting about 1 in. The door was then hung with these pins in the slot of the trolley track, and the result was a door that would slide freely in either direction, yet was held firmly from swinging in or out. One hinged door was provided with top and bottom bolts on the inside as shown. The middle door had a hinged hasp attached that would fit over a staple in the other door. By means of this arrangement the doors could be locked with a padlock from the outside. When one side was to be opened the sliding door was pushed over a hinged door and the opposite one swung open.—Contributed by E. E. Harriman, Los Angeles, Cal.

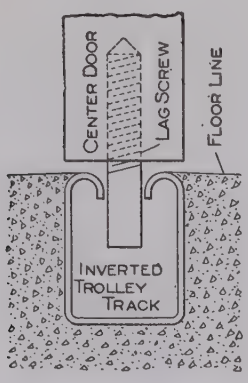
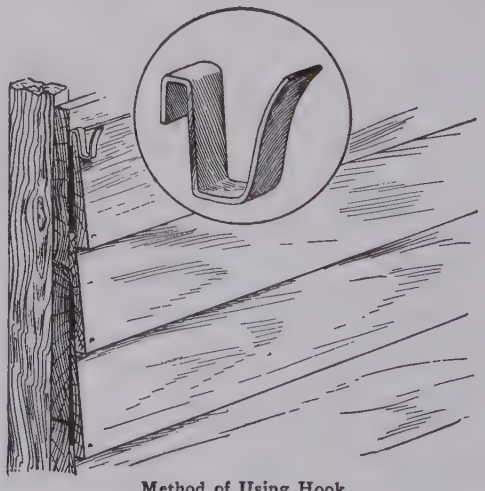


Fig. 2

Hooks for Holding Siding While Nailing

When placing on long lengths of siding or weather-board a carpenter finds it necessary to supply some sort of support for the one end while he marks the other for sawing to length. The most common method of obtaining this support is to temporarily drive a nail into the last board put on and allow it to project far enough for the next board to rest upon. As fast as a board is nailed in place the nails which acted as its temporary support must be withdrawn and moved up the width of one board. This procedure not only takes considerable time, but unless extreme care is used, one is liable to crack quite a few boards, since the temporary nail must be driven at a point where the board is not very solidly backed.

A convenient substitute for the above



Method of Using Hook

method is to use two hooks as shown in the accompanying sketch. These may be made from the metal strips found on every bunch of shingles, but are preferably made from spring steel,

if one expects to have very much use for them. The dimensions of the hooks are made to suit the lap desired. It will be found that it is much easier to move the hooks up as the work proceeds than it is to drive and pull the nails as is customary.—Contributed by M. R. Wells, Racine, Wis.

One-Man Bag Filler

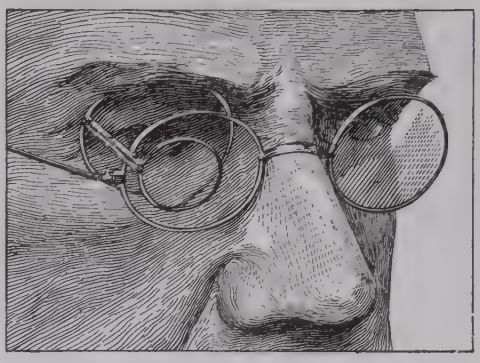
It very often happens that one wishes to fill sacks with small grain, apples, potatoes, etc., but has no one to help hold the bag. An excellent method of doing this is to procure an old wooden or metal bucket and knock out the bottom. If it is a metal bucket, file the

Bucket Without a Bottom

edges smooth to prevent its tearing the bag. Set the bucket in the mouth of the bag as shown in the illustration and you will have no trouble in filling it. —Contributed by D. J. Tancik, Lyons, Iowa.

Extracting Small Slivers

Frequently a workman is unfortunate enough to get small slivers of wood or steel or iron into the flesh and have them break off level with the surface of the skin. These little slivers are often too small to be seen with the naked eye and are therefore very difficult to remove. They are very painful and a cause of much annoyance, but if the workman has a small folding pocket magnifying glass as shown in the accompanying sketch his troubles are



Microscope Used with Eye Glasses

soon over. This little magnifier can be used with glasses as well as without and can be folded up and kept in a small leather case to prevent its being broken. Every machinist should own one as it would be the means of preventing a great deal of discomfort.

Refrigerator Made of a Barrel

An inexpensive refrigerator can be made by using a water-tight barrel, on the inside of which is placed a metal box, supported on a stand set on the bottom of the barrel. A hinged door is supplied to cover the opening. The metal box can be made of heavy tin or galvanized sheet iron, well soldered along the seams. The barrel is then filled about the metal box with coarse gravel, leaving room at the top for the ice. The metal box with the support and board for holding the ice is shown

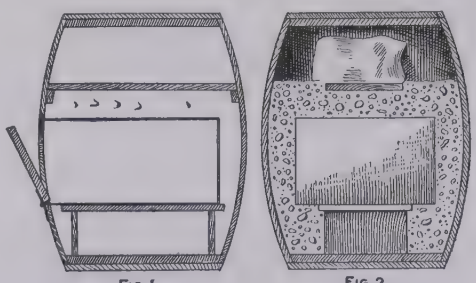


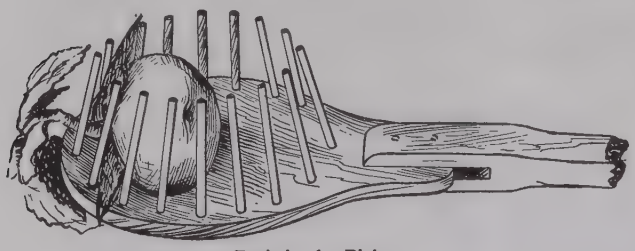
FIG. 1 FIG. 2

Barrel Refrigerator

in Fig. 1, and the completed ice box in Fig. 2. A hole must be bored in the bottom of the barrel to drain out the water.—Contributed by C. C. Brabant, Alpena, Mich.

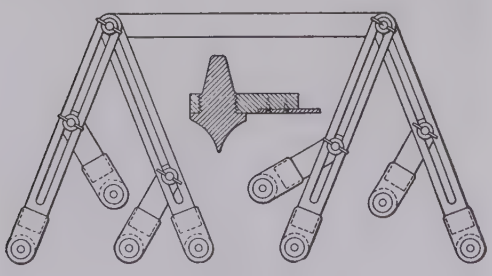
Tool for Transferring Holes

Machinists and repairmen often have occasion to transfer a set of holes from one piece of metal to another, a difficult



Fruit in the Picker

task unless one has the proper templets. The little tool shown in the accompanying sketch was devised for this work and has proven very satisfactory. Simply loosen the thumb-nuts and let the different points and arms conform themselves to whatever position the holes may be in, tighten the nuts, set the instrument on the work with the sharp points down, and tap each one a slight blow with the hammer. If the end points are marked first they will tend to hold the tool in place while the others are being marked. It is a universal tool as it can be used for any number of holes up to eight at one time. The small sketch in the center



Details of the Templet

shows the detail construction of the punches and end plates. The points of the punches should be hardened.—Contributed by C. G. Smith, Brooklyn, New York.

¶Reverse the flow of electric current periodically to reduce the wear on vibrator points.

A Fruit Picker

Scattered fruit on a tree is hard to pick by climbing a ladder. If the fruit is shaken off, the fall will cause bruises that make it unfit for storage or shipping. I devised the picker shown in the accompanying sketch to remove the fruit growing on the ends of branches and in places not easily accessible.

The device consists of a long handle to which is attached a board having pegs 9 in. long fastened in a circle, and set so that their ends incline toward the center. The stem will slip through between the pegs and the fruit can be easily pulled off and retained by the pegs.—Contributed by E. H. Nahm, Cleveland, O.

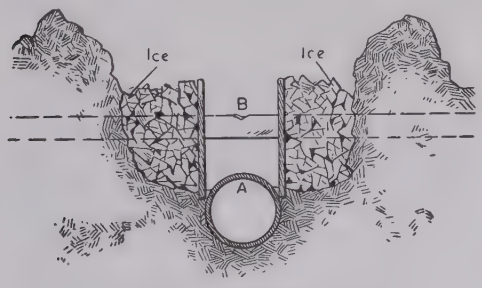
Drilling Holes Half in Cast Iron and Half in Steel

Anyone who has tried to drill holes half in cast iron and half in steel knows how difficult it is to keep the hole exactly divided between the two metals. A case of this kind is where a cast-iron wheel is held on the end of a shaft with a round key. Cast iron being much less dense than steel, and containing numerous small holes, induces a drill, no matter how well started, to follow the law of least resistance, and if the hole is deep enough it will surely end up entirely in the cast iron. A good way to overcome this is to chip, file or plane in the steel piece a slot as long as the length of the hole to be drilled. In size make it about one-third the area of the final half hole in the steel. Then assemble the two pieces and start the hole half and half, and you will end up with a very nearly straight hole. This slot, which reduces the amount of steel to be removed by the drill, offsets, or rather balances the lighter structure of the cast iron and has this effect for the whole depth of the hole.—Contributed by D. Hampson, Middletown, N. Y.

Freezing Water in a Main to Make Repairs

In removing an old water main the workman doing the digging accidentally hit a lead pipe which branched from the new main, making a hole from which the water flowed quite freely. As it was impossible to shut the water off, a difficult problem presented itself as to how the leak could be stopped and the pipe repaired.

In the accompanying sketch A shows the main that was being removed and B shows the break in the lead pipe where the workman pierced it with a pick. Ice and salt were packed around the pipe which slowly froze the water within and stopped the flow. This enabled the men to solder up the hole,

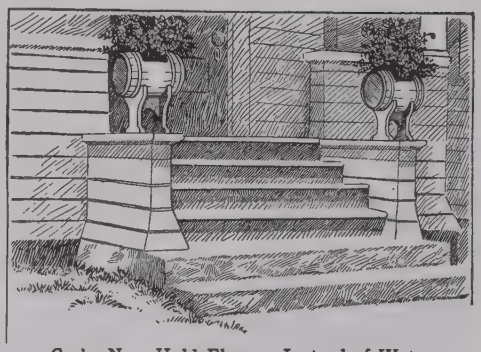


Freezing the Water Main

after which the ice was removed and the frozen water allowed to thaw.—Contributed by Frank L. Walter, Dayton, Ohio.

Turning Polished Nuts

Almost all machines are made with some nuts or bolt heads finished "bright" or highly polished, and to set them up tight and not mar the surfaces calls for more than an ordinary monkey wrench. A special socket head must be made to fit the head close and used with an ordinary wrench in turning a nut. Where only a few bolts or nuts are to be tightened, take a strip of heavy tin or zinc and bend it to the shape of the nut to take the place of the special socket head. The jaws of the wrench should be perfectly parallel and set up as close as possible.



Casks Now Hold Flowers Instead of Water

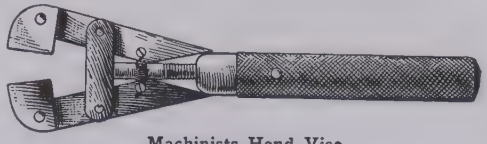
Jardinieres Made of Water Casks

This pair of attractive porch ornaments can be easily duplicated by any handy man who can find a couple of small kegs and some bits of boards.

The ones shown in the illustration are little oaken water casks with oval heads which set on a little rack, such as are used on shipboard. The bunghole was enlarged with a key-hole saw to a diameter of 5 in., then the improvised flower pots were filled with earth and plants set in. A couple of coats of paint add to their appearance.

Hand Vise

A neat and serviceable little hand vise that will be found very useful in the workshop is shown in the accompanying illustration. The jaws are loose on the pins and have a spring at the back which allows them to open parallel. The jaws are also held open at all times by means of this spring. They will hold a tapered piece of work as well as a straight piece and readily adapt themselves to fit any odd shape. They are adjusted by turning the handle, which moves the threaded rod,



Machinists Hand Vise

fastened to the crosspiece, in or out, as the case may be, thereby opening or closing the jaws.—Contributed by Robert Stewart, Hartford, Conn.

A Rain Gauge

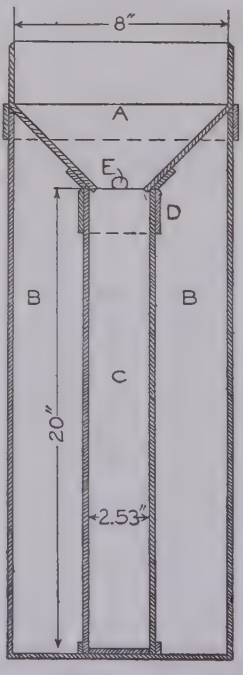
By SAMUEL K. PEARSON, JR.

Rainfall is measured on the basis of the depth of water which would accumulate on a perfectly level surface provided all of it remained as deposited without loss by absorption, "run off" or evaporation. The instruments used to determine the depths of the fall, most commonly known as rain gauges, are neither well known by sight nor is the method by which they record the rainfall perfectly understood by the general public. With such a gauge an amount as small as 1/100 in. may be measured without difficulty.

Rain gauges are composed of three parts: the receiver, A, the overflow attachment, B, and the measuring tube, C. Those used by the United States Weather Bureau are of the type shown in the accompanying illustration. The top portion of the receiver A is 8 in. in diameter inside, which has a funnel-shaped bottom to carry the rainfall caught into the long narrow cylindrical measuring tube C. The height of the measuring tube inside is 20 in., with a diameter of 2.53 in. As the area of the receiver is greater than the area of the measuring tube, a small portion of rainfall will show quite a depth which is easily measured. The amount shown in the measuring tube is 10 to 1. For example: an actual rainfall of 1 in. taken in the large receiver would measure 10 in. in the measuring tube, while an actual fall of 1/100 in. would produce 1/10 in. in the tube. The depth of water in the measuring tube is obtained by inserting a narrow stick or ruler graduated in inches and tenths of inches.

The measuring tube will hold 20 in. of water or 2 in. actual rainfall. Such an amount is considered a heavy fall, but for the measurement of excessive falls of rain the sleeve D of the funnel receiver fitting closely over the top of the measuring tube is provided with a little opening, E, on the same level with the top of the tube, so that the excess water will escape through this opening into the large overflow attachment, B. The surplus water caught in B can be poured into the measuring tube and the amount added to the 2 in. which filled the tube to the brim.

During the winter months both the receiver and the measuring tube are removed from the gauge so that precipitation falling in the form of snow or sleet may be caught in the receptacle. The snow is then reduced to water and poured into the measuring tube and its depth obtained by the same method as rainfall. A record of the depth of snowfall unmelted is also observed and recorded, and it is usually found that its equivalent in water is 10 to 1, that is, 10 in. of moderately moist snow will produce, when melted, 1 in. of water. Frequently it will yield a much lessser or greater amount of water, according to the quality of the snow, whether of a



light and dry, or heavy and moist character.

The regular stations of the weather bureau use an electrical recording gauge, equipped with a small tipping bucket below the funnel, which tips when filled with each 1/100 in. of rainfall, and records each tip upon a chart. Thus the amount of rainfall is measured by the number of tips which can be recorded at any distance from the gauge.

Speed of a Shaft Found Without an Indicator

Having occasion to take the speed of a line shaft, and finding that I had left my speed indicator at the office, I used the following method which may be of service to others in the same predicament.

Simply strike the end of a shaft with a hammer, as shown in Fig. 1, hard enough to make a small dent or depression on the edge. Hold your finger on the edge, guiding it with the thumb as shown in Fig. 2. The depression, A, is easily felt as it travels under the

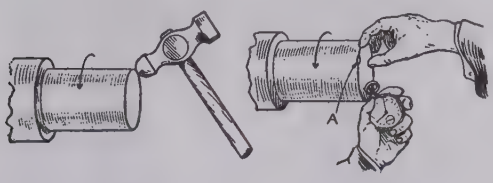


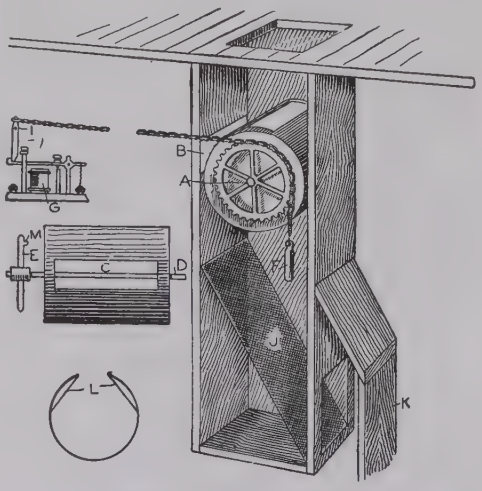
FIG. 1 FIG. 2

Finding the Speed of a Shaft

finger, and in this way the speed of shafts running as high as 300 to 400 r. p. m., may be more accurately taken than with any indicator except the most expensive ones with automatic stops.—Contributed by E. W. Davis, Chicago.

Automatic Horse Feeder

A simple and easily constructed device for feeding a horse his grain at noon when no one is about is shown in the accompanying detail sketches. The chute opens through the floor into the grain bin above, and is drawn with the end board removed in order to better show the arrangement of the drum. A drum having a diameter the same size as the width of the chute, is fitted into it and revolves on the axle D,



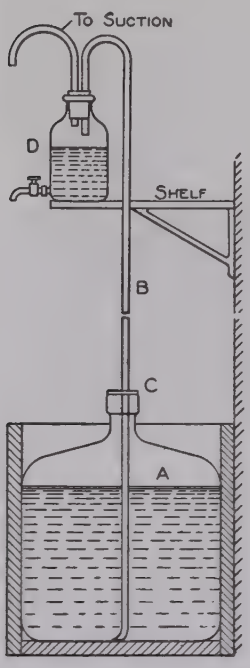
Feeder Operated by Electricity

to which it is securely fastened. It is provided with a slot, C, for the grain to pass in and out. The axle projects at one end and to this is fastened an ordinary bicycle sprocket wheel as shown. A lug, M, fastened on a spoke of the sprocket wheel, allows the drum to turn only half way around. This is an important feature of the device. A bicycle chain with a weight, F, at one end, is hung over the wheel as shown and the other end is fastened over the end of the small lever. This lever works on a pivot, I, and is released by means of the telegraph sounders, thus letting the chain slip off. When released the weight turns the drum and empties the grain. The telegraph sounder gets its electrical connection from an alarm clock in the home. As the grain is dumped from the drum it falls on the screen, J, thence into the chute, K, and drops into the feed box below. A couple of flash tins, arranged in the drum as shown at L, will help to empty the drum completely.—Contributed by C. G. Smith, Brooklyn, N. Y.

¶Always put a washer on a lag-screw before turning it into the wood.

A Convenient Method for Handling Acids

The device shown in the accompanying sketch is simple and inexpensive, and its advantages are many. Nothing but glass comes into contact with the acid, no fumes escape into the air. The carboy is not subjected to pressure, nor is it necessary to move it, thus obviating all danger of splashing, etc., says a correspondent of the Chemical Engineer.



The figure is self-explanatory. A is the carboy, B a glass tube ¼ in. in diameter, bent at the lower end so that the bottom of the acid may be reached, C is a loose cover of sheet packing, to keep dust out of the carboy; D is a 2-liter bottle, closed with a 2-hole stopper. The tube B passes through one hole, and a short bent tube through the other, to which is connected, by means of a rubber tube, a suction or filter pump.

On starting the pump a partial vacuum is created in the bottle and the acid flows into it. To stop the flow it is only necessary to disconnect from the pump. By using an aspirator bottle with a glass stopcock at the bottom, the apparatus may be made permanent and need not be disturbed until the carboy is empty.

¶Automobile oil lamps should be emptied and boiled in water once a month. This will remove all dirt and prevent them going out when in use

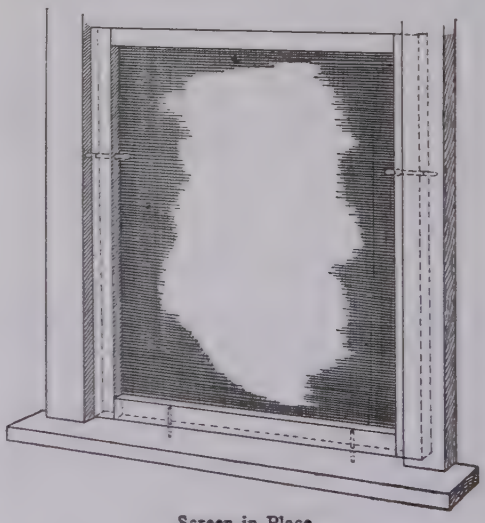
Repairing Leak in Water Leg of Fire Box Boiler

Fill the water leg with a mixture of two parts cement and one part sand so as to cover the leak, and allow to stand over night. When repaired in this manner the boiler can be used for months, if necessary, or until permanent repairs can be made.

Government boiler inspectors have allowed such repairs, made on marine boilers, until the boat could be laid up for repairs or went into winter quarters, where the leak was so bad that it could not be patched, except by putting in new sheets.—Contributed by J. P. Cowing, Chicago.

Fastening a Screen Frame in a Window

A simple way to fasten screen frames in windows is to cut off the heads of two wire nails and use them for pins in the bottom piece of the frame. Bore small holes in the sill to receive the pins. Use two old-fashioned spring



Screen in Place

window stops for the sides. The screen can be put in and taken out quickly.—Contributed by F. D. Heiser, Biddeford, Maine.

¶Never change a single ball in a bearing. Renew them all.

Home-Made Door Knobs

A substitute door knob can be quickly made in the following manner: Take the unbroken knob, imbed it in some soft clay, and make a hole around the bolt so the metal can be easily removed. After the clay is well pressed together, as shown in Fig. 1, it is cut in two with a thin sharp blade of a knife. The knob is then removed, leaving a perfect clay mold in halves, as shown in Fig. 2. Fill the lower half of the mold with a neat mixture of cement. Place the bolt taken from the broken knob in the hole made in the other half of the mold and fill it with cement well packed around the metal bolt. Then place both halves of the mold together and set aside until the cement hardens. It is best to remove the knob from the mold before it is too hard and paint the surface over with a very soft mixture of cement to fill all

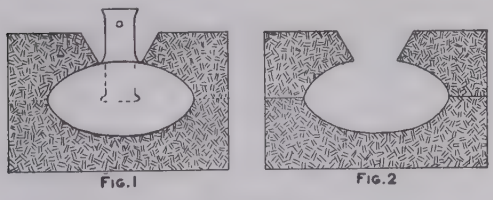


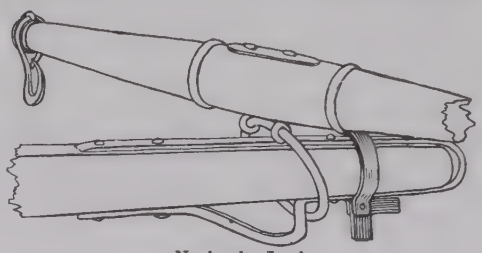
FIG. 1 FIG. 2

Clay Molds

holes. The knob can be smoothed up with fine sandpaper before the cement has set hard. If a coat of enamel is applied the cement knob cannot be detected from the original porcelain knob.—Contributed by C. C. Brabant, Alpena, Mich.

Holding the Neckyoke on a Tongue

The little device illustrated herewith, when applied to the end of a vehicle tongue, prevents the neckyoke from slipping off and may thus avert a disastrous runaway. It is made by bending a piece of ½-in. rod, about 4 in. long, at right angles and drilling a hole through it in the bend. This is attached to the under side of the tongue by an iron strap, fastened around the wood so that the rear angle hangs down and the forward angle lies parallel with the tongue. When the ring of the neckyoke is passing over the end of the tongue the lock is tilted forward



Neckyoke Lock

and then drops back in position as shown, after the ring is in place.—Contributed by Thos. L. Parker, Olaf, Iowa.

Paint Brush Hangers

Proper attention should be given to paint brushes, while in use as well as when laid aside. Two small clips made of tin or galvanized iron, and fastened to one side of each brush, as shown in Fig. 1, will provide a means to keep it from slipping into the paint pot. The brush can be hung on the side of the paint pot as shown in Fig 2. This will allow the paint to drain in the pot when the brush is not in use, and will also keep the bristles straight and prevent

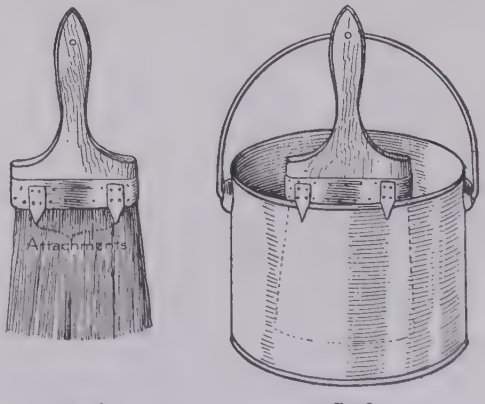


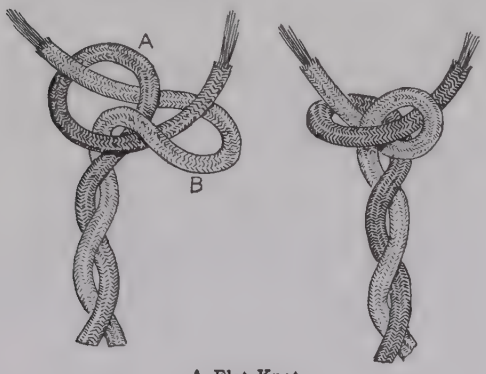
FIG. 1 FIG. 2

Clips on Paint Brushes

them from bending out of shape as they would if the brush were allowed to rest on the bottom.—Contributed by W. A. Jaquythe, Richmond, Calif.

A Knot for Flexible Lamp Cord

A knot that pulls tight and lays almost flat like a washer slipped over the cord is valuable in wiring up lamp

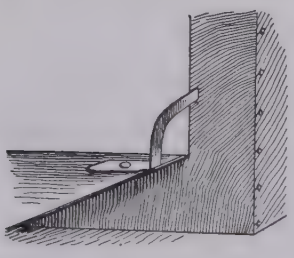


A Flat Knot

sockets and ceiling rosettes. Such a knot is made by turning cord A back in a loop, then turning the cord B back over A, passing the end under and through the loop A and then pulling tight. If the tie was not made in the right place it will come loose instantly by pushing on the cord.—Contributed by C. W. Goddard, Bellaire, Mich.

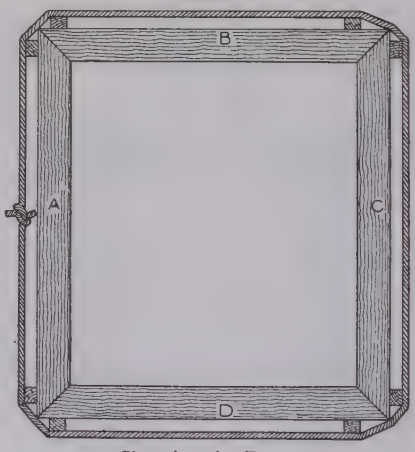
Oven Door Catch

Most oven doors are provided with a spring of some sort to overcome the jar of falling when opened. This spring often causes the door to rebound 3 or 4 in., and if the housewife is not careful the door will strike her arm as she reaches into the oven, and cause a bad burn. This rebound can be prevented if a small flat spring is bent and attached to the door with a stove bolt as shown in the accompanying sketch. When the door is down the end of the spring catches on the edge of the door frame, thus preventing its rebound. To close the door, simply press in on the spring and it will slide along the side of the oven as the door is closed. This little device will prevent many burns and is well worth the time and trouble it takes to make and attach it to the door.—Contributed by Carl P. Herd, Davenport, Iowa.



Method of Gluing Mitered Frame Joints

Have the miters cut perfectly true, then place the frame on a flat table with the miters in their proper positions. Place paper under the joints to keep them from sticking to the table while the glue is drying. Apply the glue to the miters and bring them as close together as possible. Tie a heavy cord about the frame as shown in the accompanying sketch. A trunk strap will do as well. Place eight small blocks of wood under the cord at the



Clamping the Frame

points marked A, B, C, and D, and push them towards the corners of the frame. This will tighten the cord and draw the miters firmly together. Leave in this position until dry, then remove the cord and drive nails across the corners, if necessary.—Contributed by G. B. Benford, Fair Haven, Vt.

¶Apply a coat of starch water on a dirty wall before painting. When dry the dirt and starch can be brushed or wiped off.

Home-Made Power-Driven Lawn Mower

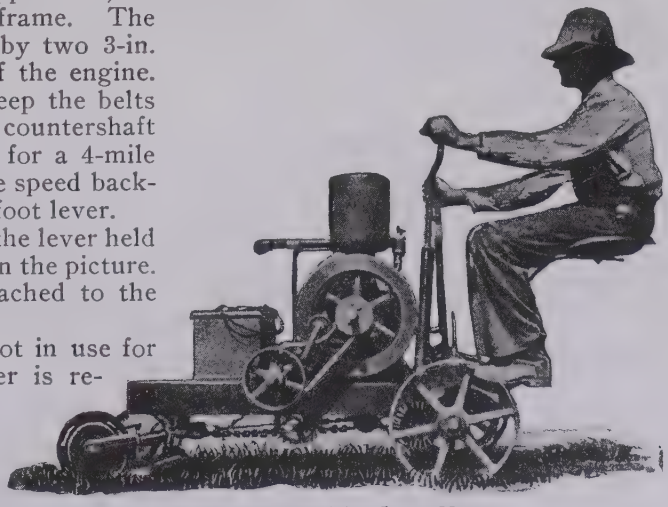
The accompanying half tone shows a machine, a home-made affair, which was constructed to drive a lawn mower, yet it can be used for various other purposes. The frame of the machine is 4 in. thick, 13 in. wide and 4 ft. long, made of hard wood. The driving axle is 2 ft. long, thus making the track 2 ft. wide. The rear wheels are 16 in. in diameter, the face of each being 4 in. wide. Only one wheel is provided with lugs for traction, so in turning a curve the smooth face can slip. No differential is provided, as it is not necessary on such a light rig.

The lawn mower is attached to the front of the main frame similar to the fifth wheel on a buggy. The handle was removed from a common 18-in. lawn mower and an arch made from 1-in. pipe to fit in its place. This arch fastens on the outside of the wheels as shown in the illustration, using the same bolt that holds the wheels on the mower. There is a 1¼-in. tee placed in the center of the arch in which is screwed a short piece of 1-in. pipe to serve as a king bolt. The latter piece of pipe passes through a hole bored in the front end of the main frame, thus forming the fifth wheel of the machine.

A 1½-hp. gasoline engine, weighing 250 lb. with all its appliances, is mounted on the main frame. The whole machine is driven by two 3-in. belts, one on each side of the engine. Two idlers are used to keep the belts taut. The belts drive a countershaft which has a sliding gear for a 4-mile speed forward and a 3-mile speed backward, both operated by a foot lever.

The guiding is done by the lever held in the left hand as shown in the picture. The guiding chain is attached to the lower end of this lever.

When the machine is not in use for cutting grass, the mower is removed and a two-wheeled axle put in its place. The wheels on this axle have a 2-in. face and a diameter of 12 in. The axle is made of 1-in. pipe, 2 ft. long. The wheels have a band placed on the center of their faces to keep them from slipping when making turns. The engine can be used for sawing wood, grinding feed or running a washing machine.—Contributed by Herman A. Grimund, Bristol, Ill.



Gasoline Engine Driving Lawn Mower

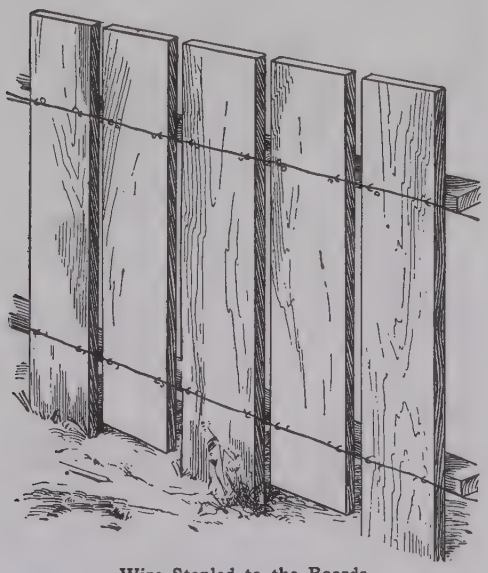
A Home-Made Garden Weeder

A home-made hand weeder for use about the garden is shown in the accompanying sketch. Grass and weeds can be quickly and easily cut or combed from about small plants by means of the sharp saw teeth. The end can be used as an individual weeder, trowel, or transplanter. It is made of a piece of steel of about the thickness of a garden trowel and 1 in. wide. Bend it and attach a handle, then file or grind in the sharp teeth as shown.—Contributed by W. A. Jaquythe, Richmond, Cal.

Saw Tooth Weeder

Holding Boards on a Fence

A board fence soon goes to rack and ruin after one or more boards fall from place. A large company having

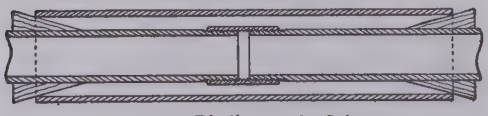


Wire Stapled to the Boards

branches in several cities, keeps its merchandise in enclosures fenced in with boards nailed perpendicularly on cross bars between posts. To prevent any boards from falling should they become loose, the company have adopted the plan shown in the sketch. A wire is stretched and fastened with staples driven in each board on the side opposite the crosspieces.—Contributed by J. J. O'Brien, Buffalo, N. Y.

Reinforcing Pipe Lines at the Joints

The scheme shown in the accompanying sketch will be of service to those who have occasion to connect



Prevents Binding at the Joints

up a pipe line across a stream or space when it is necessary to connect up the line before it is put in place.

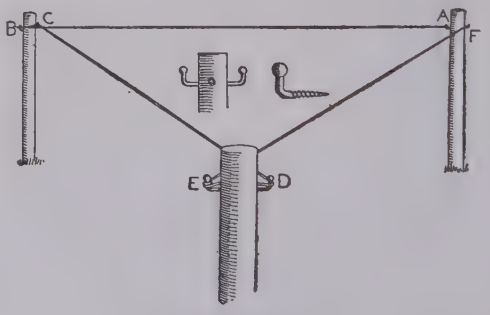
A piece of pipe somewhat larger than the pipe being connected is slipped over the line at each joint. After the joints are screwed together tightly, wedges with long tapers are driven between the pipes in such a manner that the tendency to bend in the joints will be prevented by the sleeve before the connection loosens with the strain.—Contributed by J. H. Cruger, Cape May City, N. J.

How to Utilize Old and Thick Paint

To utilize old and thick paint when a paint grinding mill is not at hand, grind the paint through an old meat cutter, using the nut butter grinder. Thin it with turpentine and oil. In this manner all accumulated leavings in paint cans can be used.—Contributed by J. P. Cowing, Chicago.

Post Hooks for a Clothesline

Secure several ½-in. lag screws, 5 in. long, forge the square head in the shape of a round knob, as shown in the small, center sketch, and bend the end up. Each post must be provided with two of these hooks, one opposite the



Clothesline Hooks

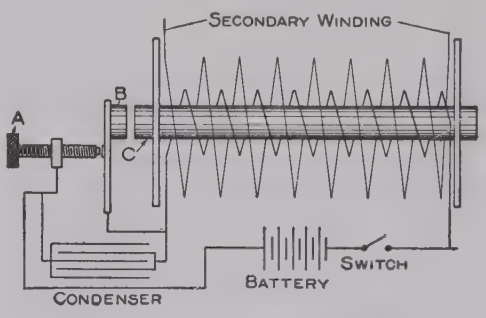
other, at the top end. One end of the rope is fastened at A, drawn taut around the hook C, thence to B and across to D, from D to E, E to F, and then tied.

¶Sprinkle unslaked lime along the comb of a roof, and the rain will dissolve it and carry it over the shingled surface, thus removing moss and accumulations of dirt.

How to Adjust a Spark Coil

Standard makes of spark or induction coils, when properly adjusted, consume nearly one-half ampere to each engine cylinder. If the contact points are screwed together too close, the current consumption will be increased with a less mileage than can be secured with the same battery with the coil properly adjusted. It is advisable in every case to adjust the coil until it will take no more current than is necessary. To do this use the ammeter either connected in the place left for the connection on the coil, or into the battery connection, so the current will flow from the battery through the ammeter to the coil. If the coil has a number of units intended for use with a multiple cylinder motor, place a piece of paper under all except one of the points while the engine is running. Adjust this point until the current taken is a minimum, without any tendency to miss explosions. If the engine will not run on the one cylinder, the current taken by each of the points may be determined by blocking this one point off with a piece of paper and noting the change in the current taken. It may be necessary to go over the operation a number of times to find the lowest consumption on which the engine will run properly. In most cases the coil vibrator will not need adjusting.

The method of construction of a spark coil is shown in the accompanying sketch. If its principles are thoroughly understood, its adjustment will prove quite simple. When the adjusting screw A is turned inward, forcing the vibrator B nearer the pole or core C, the rate of vibration will be increased, and when the screw is turned outward the rate of vibration is decreased. However, there are definite limits to the proper operation of the core C, at either loose or tight adjustments. The adjustment that would prove suitable for low speeds, may be very unsuitable for high speeds and vice versa. This may be applied to the strong and weak batteries. Therefore, when possible, it is advisable to attend to the battery rather than the coil adjustments. When the jump spark coil



Induction Coil with Condenser

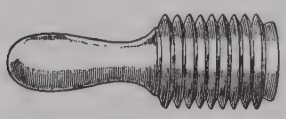
is used it is advisable to have two sets of batteries controlled by a two-point switch. The vibrator B should vibrate with a rapidity sufficient to give a clear musical sound. Rapid vibration, except of course one that is excessive, will be much better for the battery than one that is slower. When the rate of vibration is reduced it increases to a certain extent the efficiency of a weak battery, as this allows time for the current to more fully saturate the windings of the coil. The vibrator should buzz only at the closing of the primary winding or circuit when the contact is made at the points of the commutator.

The object of the condenser is to reduce the sparks at the points of the primary winding and to generate them in the secondary winding much more brilliant and intense.

In selecting a coil it is necessary to see that it is suited to the type of battery or generator with which it is to be used. The best results cannot be obtained unless the coil and source are mutually suited to each other. This rule will hold good for all types of generated current, but is particularly true if the small dynamo is used in place of batteries.—Contributed by J. N. Bagley, Webber, Kan.

Home-Made Steak-Beater

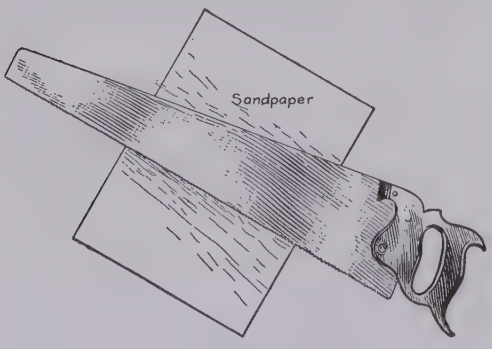
I had a job to turn out a steak-beater on my lathe for a customer, and it looked good to me; so I experimented a little, turnning out quite a number of them in different woods. The size adopted as the best is 3 in. in diameter and 8¾ in. long over all. The diameter at the depth of the grooves is 2⅜ in. The width of each groove from point to point is ⅜ in., with the end turned off rounding ½ in. long. The handle is 1¼ in. in diameter at the smallest place and 1⅝ in. near the end.



The beater should be turned from close-grained, well-seasoned wood. Hickory, pecan, osage orange and beech are good. Cut the grooves about the same angle as a V-thread. The end can be used as a potato masher.—Contributed by J. W. Brelsford, Houston, Texas.

Tearing and Folding Sandpaper for Use

Sandpaper can be torn quite easily by placing it under a fine-toothed saw, with the sand side down, and tearing up as shown in the accompanying sketch. This does not damage the saw



Tearing Sandpaper

and the sheets can be torn to any desired size convenient for use. If the paper is folded four double, better service can be had from it than by using it in single sheets. By thus folding two sides can be used and when worn, the two unused sides can be turned out. If the smooth side of the paper is chalked before it is folded it will prevent its slipping when in use.—Contributed by C. Purdy, Ghent, O.

Removing a Hook from the Mouth of a Fish

Fishermen who have trouble keeping the mouth of a fish open while removing the hook, will be interested in the little device shown in the accompanying sketch. The spring shown will do the work very nicely and the hook can be easily removed with a disgorger, thus saving many broken lines and cut fingers. This device is especially useful to the ladies who enjoy fishing, but dislike the operation of removing the hook.—Contributed by F. S. Cummings, Detroit, Mich.

Spring in the Mouth

Cutting Oil Grooves

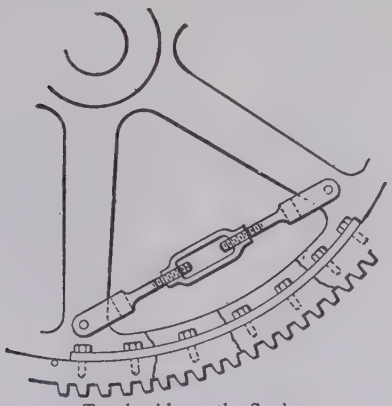
For some classes of work the ordinary oil groove is undesirable. For instance, a tight belt running down from a countershaft exerts a considerable pull on the upper bearing and a liberal oil groove, cut straight across the top, lessens the wearing surface, and hastens a renewal. However, plentiful lubrication must be provided for in some manner. A good way to cut oil grooves is to chuck the bearing, and with a boring tool having a round point cut a thread right through the box. The thread should be of a coarse pitch, say, ½ to 2 threads per inch, depending on the size of the bearing. Right and left threads can be cut, if

desired, in the same bearing, each starting from the oil hole and so cut that the oil will follow around the box when the shaft revolves.

An Emergency Gear Repair

The accompanying sketch shows a quick repair job of a spur gear. This gear is one of a series of drier gears on a large paper machine. The gear broke one day about 1:30 a. m., and at 6 a. m. the paper machine was again doing business, says a correspondent of the American Machinist.

It seems the company had no extra gears in stock, so the master mechanic was called in to repair the gear. He found two old steam-pump valve-rod heads and a turnbuckle which he arranged as shown in the sketch. While he was doing this the other men were

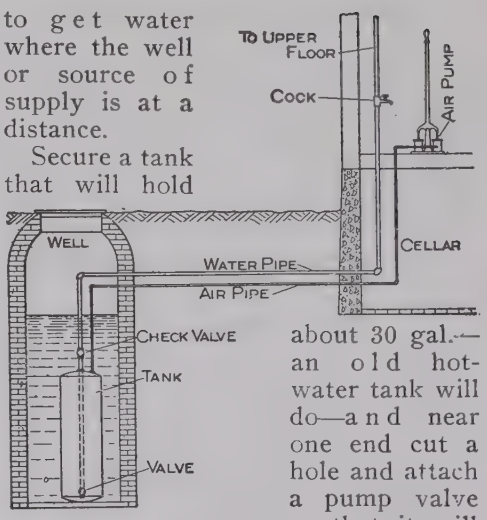


Turnbuckle on the Spokes

drilling and tapping the holes in the rim of the gear, also forming the straps, one on either side. These were bolted fast, then the turnbuckle screwed up, and the repair was complete. This repaired gear has been in use for two years and is still doing good work.

Home-Made Pneumatic Water System

A simple and inexpensive installation of a pneumatic water supply system for country homes is shown in the accompanying sketch. In cold and stormy weather it is a great convenience, as it is not necessary to leave the house to get water where the well or source of supply is at a distance.

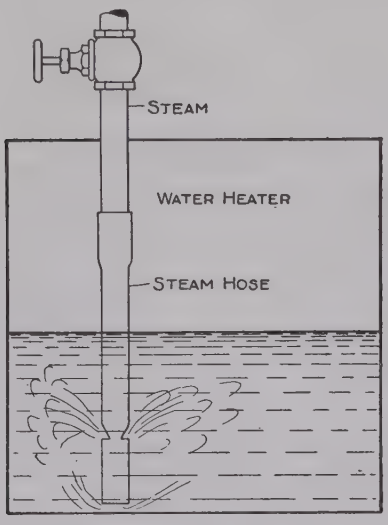


Secure a tank that will hold about 30 gal.—an old hot-water tank will do—and near one end cut a hole and attach a pump valve so that it will let the water into the tank, but close when it has a back pressure. This tank is to be set upright in the well, with this valve near the bottom as shown in the sketch. The supply pipe should be put into the tank and run to within about 1 in. of the bottom. A check valve is put on the pipe near the tank, then the connection made to the house. The water pipe should be underground and deep enough to prevent freezing in cold weather. Now attach a ⅜-in. air pipe as shown and connect it to an air pump in the house. An old bicycle pump will do if you have nothing better. A valve is attached to the pump so the air can be let off when necessary.

The tank, being under water, fills itself as soon as the air valve is opened. When it is full the valve is closed and a pressure put upon the water by means of the pump. This pressure forces the water through the supply pipe into the house, where it can be drawn off through taps as wanted. When the tank is empty it is filled again by letting the air pressure off at the air valve. When full, close the valve and pump air as before. The simplicity, ease of operation, and low cost of installation of this pneumatic system should commend it to any one in need of such a device.—Contributed by H. A. Carmichael, West Lorne, Ont., Canada.

A Noiseless Water Heater

A noiseless water heater that is easily and quickly made is shown in the accompanying sketch. Secure an

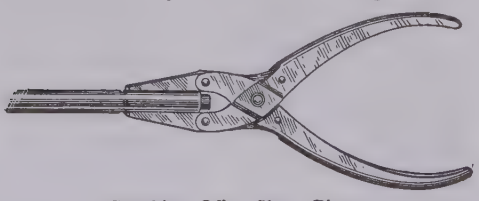


Steam Hose on the Pipe

old piece of steam hose and cut it out about 6 in. from one end as shown. Fasten the other end to the steam pipe and the heater is complete.

How to Cut Water Gauge Glasses

Where a short length of tube is to be cut off I proceed in the following manner: I mark the tube at the point to be cut with a three-cornered file, making nicks exactly opposite each other, then cut a hardwood plug and shape it to fit in the tube up to the marks. Some rubber or other soft material is placed on the tube to prevent it being crushed easily and then I grasp it



Breaking Off a Short Piece

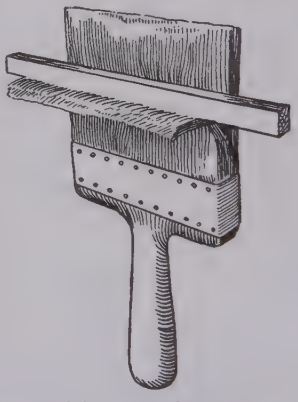
firmly with a pair of pliers as shown in the sketch. The short piece is easily broken off.—Contributed by Frank Lacina, Canby, Minn.

Color of Sparks

The color of the sparks given off by an emery wheel is a guide to the kind of metal being ground. Sometimes this is the most easy and handy way of distinguishing tool steels. Cast iron gives off dull red sparks and they stay close to the emery wheel. Wrought iron gives a spark similar to cast iron in color, but more like the spark from mild steel, which is bright yellow and flies from the wheel considerably. Self-hardening tool steel and the tungsten alloy steels make a thick shower of dull sparks, very much like the cast-iron sparks in color.

Care of Calcimine Brushes

Brushes used for calcimining will come apart if proper care is not taken to prevent them from rot, rust and drying out. If the brush is in continuous use there is danger of the bristles becoming rotten at the roots, as well as of rusting the metal binding, and if it is laid away for a time the drying and shrinking will cause it to come apart. All these troubles can be prevented if the brushes are treated in the following way: When the brush is new, or comparatively so, it should be thoroughly dried after being washed clean, then a mixture of the best spar or floor varnish and turpentine in equal parts should be poured into the binding and roots of the bristles until it has soaked through.



The manner in which this can be accomplished is shown in the accompanying sketch. Hold the brush in a vertical position with the handle down.

then part the bristles in the middle with a piece of sheet metal or a long blade of a knife. Slowly pour the mixture along the roots of the bristles until it has soaked through all around. The varnish should be warm, but not hot, to enable it to thoroughly soak in when poured into the brush. Three days at least will be required for the varnish to dry, and during this time the brush should be kept in a vertical position with the handle down. This treatment should be repeated every time there is indication of the bristles loosening, but if done thoroughly at first it is all that will be required.—Contributed by Samuel Nelson, Chicago, Ill.

Hose Fastener

A wrought-iron nail makes a very good fastener for a hose band. It can be drawn tight and will remain so, is much stronger than wire, and takes

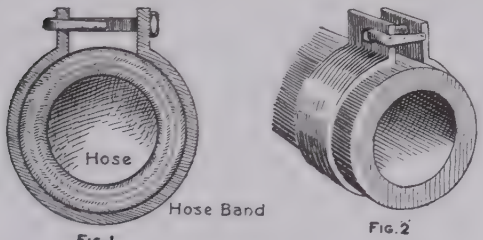


FIG. 1 FIG. 2

Clamp on Hose

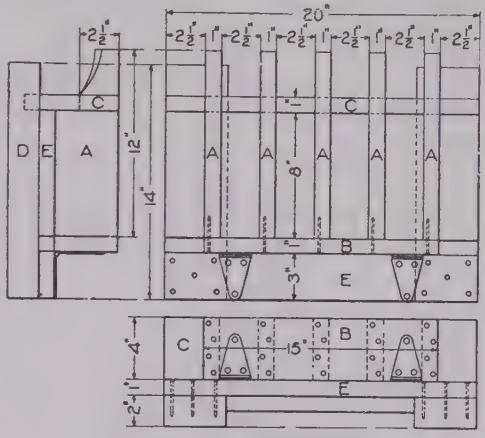
much less time and trouble to adjust than a short or rusty bolt. Figures 1 and 2 show plainly the method of attaching it to the band.—Contributed by J. M. Kane, Doylestown, Pa.

Mixing Starch with Calcimine

Select a good grade of calcimine, that to be mixed with hot water preferred. While the mixture is hot stir in 1 pt. of cooked starch such as is used in a laundry. The addition of the starch not only keeps the calcimine from drying out quickly, but it helps the mixture to cover the surface. —Contributed by Fred L. King, Islip, Long Island.

An Easily Made Concrete Brick Machine

Brick, which are a necessity upon every farm, can be easily and cheaply molded in spare moments by the use



Details of the Brick Forms

of the simple machine shown in the accompanying detail drawing.

To build, first secure five pieces of hardwood lumber, A, 1 by 4 by 12 in., and sandpaper the sides smooth. Shape a handle on one end of each and notch as shown in the end view. These five pieces are nailed to the piece B, which is 4 in. wide and 15 in. long. They should be spaced exactly 2½ in. apart, which is the thickness of an ordinary brick.

Piece C is now cut 6 in. wide and 20 in. long and notched 2½ in. deep at the top so that the division strip will set down into the notches. Two crosspieces, D, are cut 15 in. long and of 2 by 4-in. stock. Nail the piece E, which is 3 in. wide and 20 in. long, to these crosspieces as shown. The piece B is hinged to E so that the division strips, A, attached to the piece B may be raised upright and thus free the molded brick. Nine inches from the piece E fasten the piece C to the cross strips. This must be placed upright as shown in the illustration and may be fastened to the cross strips with small brackets to make it rigid. As this piece is 6 in. wide it must be cut out 1 in. at the bottom so as to set down upon the cross

strips and yet have the top level with the top of the division pieces A, so that the tops of the brick may be struck off smooth with a straight edge.

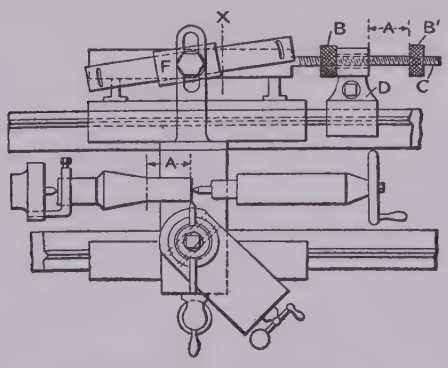
The brick are molded on a pallet which is 8 in. wide and 20 in. long. It is not fastened in any way so that it may be lifted out with the brick easily. The space for each brick is thus 2½ by 4 by 8 in., which is the standard size.

The operation is simple. Have the machine in the position illustrated, tamp the mixture into the spaces for the brick and level the top off with a straight edge. The division plates are then raised by taking hold of the part that projects beyond the board C, and lifting the whole section, leaving the brick free and on the pallet. This may then be picked up with the brick on it and set away to dry and another pallet placed in the machine, thus enabling the operator to use the same machine continuously.

All the parts of the machine should be treated to several coats of linseed oil and allowed to dry thoroughly before using, so as to render the wood more impervious to moisture and danger of warping. The concrete must not be made very wet, else it will not stand up when the mold is removed from the "green" brick. The best mixture is to use one part cement to four parts of sand or fine gravel and then wet the mixture until it is the consistency of thoroughly damp sand. Cure the brick for the first few days by covering with wet blankets. This prevents the hot sun from reaching the brick for a while, thus insuring satisfactory results.—Contributed by A. A. Houghton, Northville, Mich.

Cutting a Straight-End Taper Tap

It is sometimes amusing to see the simple manner in which some apparently hard problems are solved, says a correspondent of the American Machinist. One day the foreman received



Lathe Device for Cutting Taper Taps

a drawing of a tap which was straight for 2½ in. and then tapered for about the same distance. The taper was at least 2 in. to the foot. Turning up the tap blanks was a simple matter, but to cut the threads was quite a different proposition. Every man was busy trying to solve the problem, but it remained for a "cub" to accomplish this and he did it without any effort on his part.

The youngster was roughing out a number of small taper taps on a lathe and when they reached the man who did the finishing, he found that they were straight for a short distance on the end. It was soon discovered that the boy had not adjusted the nuts BB^1 properly and the play here was about equal to the length of the straight portion on the end of the tap. It then occurred to the foreman to try to cut the taps in a similar way. By adjusting the clamp D to the proper position and then backing up the nut B^1, a distance equal to the straight part of the tap blank it was found to work quite satisfactorily.

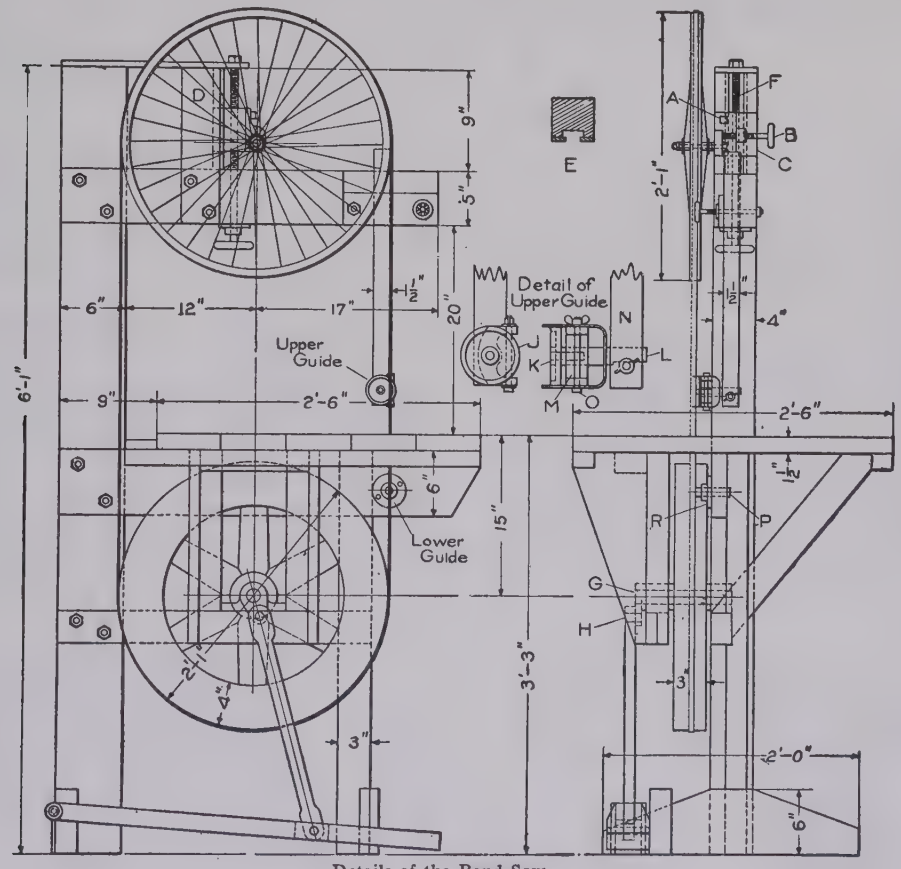
By looking at the sketch it will be noted that as long as the screw C is free to pass through the clamp D the work will be turned straight, but as soon as nut B^1 strikes the clamp D, the cross slide will then take the course set by the taper attachment.

A Home-Made Band Saw

Detail drawings are here given for the construction of a foot-power band saw. This saw will prove quite serviceable in a small wood-working shop where the material to be sawed is not too heavy.

The frame is made of standard sizes of hardwood timber. The joints can swings on the bolt A. Its angle is adjusted by means of the screw B, in the block C. This block slides in a groove in the upright piece D, a cross-section view of which is shown at E. The screw F serves as a vertical adjustment.

The bottom or drive-wheel is con-

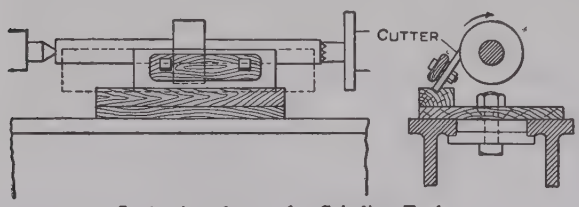


Details of the Band Saw

be halved or mortised and they should be glued and bolted securely together. Care should be taken to get them together perfectly square, else one will have trouble in lining up the saw wheels.

The top wheel is an ordinary front wheel of a bicycle which has the tire groove filled to a level with leather, then covered with a rubber belt. The axle is mounted on a casting which structed as shown and it also should have a rubber band glued to it. It is mounted on a shaft which runs in a roller or ball bearing. A crank, G, which has a 2-in. throw, is fastened at one end of the shaft, and connects to the treadle arm. The treadle is hinged to the frame, and the pin H, which connects the arm to the crank, should be so made as to be easily removed when changing saws.

The upper guide consists of a revolving brass wheel, J, with a steel pin, K, fastened in it, which turns in the end of the shaft L, as shown. This shaft is fastened in the guide frame M and has one end flattened in order to be



Lathe Attachment for Grinding Tools

clamped securely in the guide post N. The V-shaped piece of band iron is slotted in the ends for the saw and it is fastened to the casting M by means of a clamp screw, O. The holes in the band are slotted to permit of adjustment.

The lower guide consists of a short length of ¾-in. diameter, cold-rolled steel bar, P, which is held in the casting R by means of a setscrew.

This machine is very simple in design and easy to construct. It can be run by power by simply attaching a pulley to the drive-wheel axle in place of the crank.—Contributed by A. H. Petri, Philadelphia, Pa.

Flat Side on a Rubber Stamp Handle

On all rubber stamps having knob handles cut a flat place on the thumb side with the bottom of the letters toward you, and the right side up can be determined instantly without looking at the face of the type. The accompanying sketch shows where the flat side is to be made on the knob.—Contributed by W. A. Humphrey, Columbus, O.

Sharpening Cutters for Wood Planers

The sharpening of cutters for woodworking machines is often a laborious task and the pattern-maker will welcome any time or labor saver in this line, says a correspondent of the American Machinist.

The sketch shows an arrangement adapted to a wood-turning lathe by which cutters can be ground uniformly hollow. For convenience in handling, the cutter is bolted to a wooden holder and a rest for the blade to slide along is constructed either as shown or it may be connected to the existing tool carrier. This is fixed at the back of the machine unless the direction of rotation can be reversed.

The grinder is a wooden collar, say 5 in. in diameter and 2 in. wide, mounted on a spindle which should be long enough to allow the cutter to slide the full length on it. After truing up, cover the surface of the collar with thin glue and sprinkle powdered emery evenly over it. The grinding is done dry at a fair speed, care being taken not to burn the blades. The finishing edge is obtained on the oilstone.

By using different shapes of grinders, with suitable rests, gouges and other tools can be sharpened rapidly. The cost of the apparatus being insignificant, will make it appeal to small shops unable to buy an expensive grinder.

How to Mix Red Lead Paint

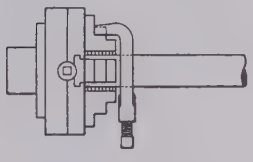
To mix red lead paint easily and rapidly use a revolving barrel butter churn. It is well known that red lead is a most stubborn pigment and hard to mix with hand paddles. By using a barrel churn to mix the paint an old painter will be surprised at the increased spreading qualities of the paint so mixed over that mixed with hand paddles.—Contributed by J. P. Cowing, Chicago.

Preventing Sore Hands Caused by Metol Developer

In using metol as a photographic developer, it sometimes happens that the hands of the operator become affected in certain places with a sort of eczema, causing the skin to peel off in scales and finally producing sores and wounds. By accident I happened to find an excellent remedy for this skin trouble in the juice which is pressed from the pores of a fresh orange peel, says a correspondent of the Moving Picture World. In case of eczema of this kind, several applications of this juice rubbed into the affected skin will cure the trouble in 24 to 48 hours, producing a perfectly smooth skin. In severe cases the healing process will take a little longer.

Holding Heavy Work in a Chuck

The accompanying sketch shows a handy method of assisting a chuck to drive heavy work. With a universal chuck it is especially useful as it is sometimes difficult to drive a heavy cut without having the chuck so tight that it is under a strain. As this is poor policy the lathe dog may be used to help out as shown. It is driven by its tail, which is set against one of the chuck jaws, thus working in conjunction with the chuck as driver.—Contributed by D. A. Hampson, Middletown, N. Y.



Adjustable Swing Table

A table or shelf which can be swung into the position most convenient, or out of the way when not in use, and that can be adjusted to any height, is a handy addition to a workbench. It can also be used as a seat. Fasten an iron pipe, P, firmly at the top and bottom by sinking it into wooden blocks, BB, which are nailed to the wall or a post. Cut a piece of board to the size and shape desired for the shelf. To this fit an iron strap, S, 2 or 3 in. wide, bent as shown in the detail

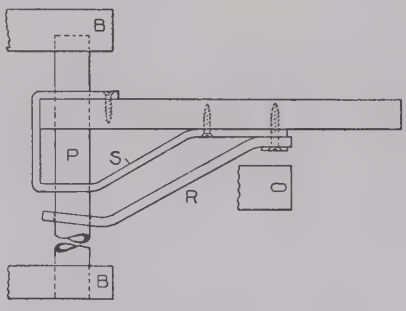
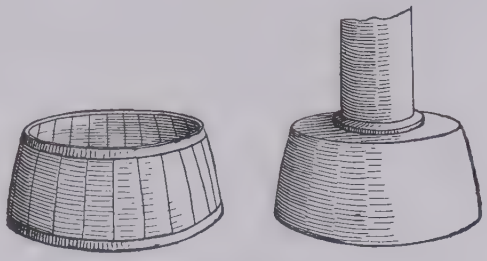


Table Can Be Raised and Lowered

sketch, and drill holes for the iron. These holes should be an easy sliding fit. In another and rather heavier iron strap, R, drill a hole at one end slightly larger than the diameter of the pipe. At the other end make a slotted hole as shown. Bend the strap and attach it to the wooden shelf and the pipe, then by the familiar principle of "binding" this shelf can be adjusted to any desired height and it will hold its position.—Contributed by C. W. Nieman, New York, N. Y.

Round Concrete Column Base Forms

A very cheap and quickly made form for making bases for columns is a barrel or keg sawed in two in the middle.

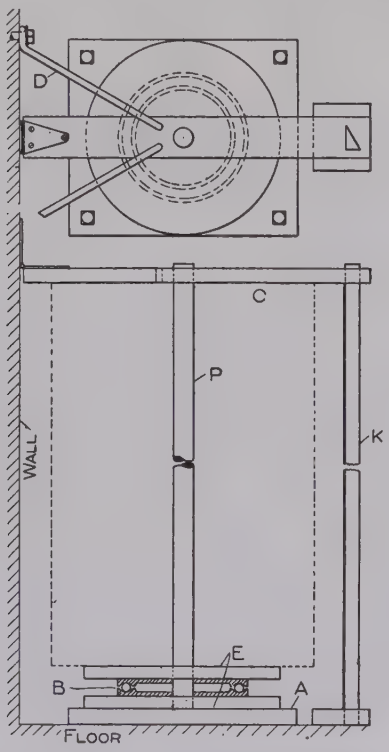


Barrel Used as the Form

The form and the completed base are shown in the accompanying sketch.—Contributed by W. A. Jaquythe, Richmond, Cal.

A Paper-Holder and Cutter

A design of a paper-holder and cutter for large, heavy rolls of paper is shown in the accompanying sketch.



Plan and Elevation of Paper-Holder

This holder may be any size in order to accommodate any diameter or length of roll. The base A is bolted to the floor; then a ball-bearing fastened to it as shown. The balls roll between two iron disks which are bolted to two circular wood pieces, E. The center post, P, may be of wood or gas pipe and should be somewhat longer than the roll of paper to be used. The post is held at the top by a crosspiece, C, which is in turn braced by the side rods D, and is hinged to the wall as shown. The knife K is held in place by means of a block on the floor and the end of the brace C.—Contributed by D. Netter, Meridian, Miss.

¶Do not lubricate magneto bearings too freely.

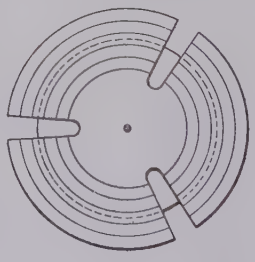
Making Corncribs Rat-Proof

Secure some heavy screen wire and cover the walls and overhead with it, using care about the corners, joints and openings to make them close. Let the wire extend down to the bottom of the crib, then make a concrete floor or bottom, allowing the concrete to come up 2 or 3 in. on the screen wire. This floor can be made on the ground, using plenty of rock for drainage, or it can be made by covering an elevated floor with the concrete.

In this way nearly the entire loss caused by rats and mice can be prevented. The wire will permit the air to pass through the bin as freely as would the usual slat or board construction. In this way the corn saved in one year would pay the expense of the concrete floor and screen lining for the crib, and the lining and floor would last many years.

Centering Tool for Wood-Workers

A sheet-metal disk with notches cut in it, and fine, circular lines drawn on its surface as shown in the accompanying sketch, makes a handy tool for quickly finding the centers of round stock, and is especially adapted for use by pattern-makers and wood-turners. Simply place it on the end of the stock, move it about until the edge of the piece coincides with the concentric lines, as seen through the slots, and then mark the center. It can be made any size desired.—Contributed by P. H. Campbell.



¶Clean coal tar pitch, free from water, acids, or soluble mineral matter, is the most efficient type of covering for iron pipes to prevent corrosion from contact with soil, or electrolysis.

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